Presented to Professor Hitchcock
with the author's compliments
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LETTER

Amherst College

FROM

BARON RICHTHOFEN

ON THE

PROVINCE OF HUNAN.

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LETTER FROM BARON RICHTHOFEN ON THE PROVINCE OF HUNAN.

20th to 26th February, 1870.

In accordance with my programme as communicated to you in my letter from Canton of Dec. 30th 1869, I have completed my journey through the province of Hunan.

I left Canton on Jany. 1st, went up the North river to Shau-chau-fu, and thence ascended its western branch, the Wu-shui, to I-chang-hien, which is just past the frontier of Hunan. By a two days' overland journey I reached Chin-chau, where I embarked on a small affluent of the Lui-ho. I then descended slowly the Lui-ho and Siang-kiang rivers to Siang-tan. It was my intention to proceed from Siang-tan by way of the Tung-Ting lake and the Tai-ping canal to Sha-si on the Yangtse, and thence by land to Siang-yang-fu in Hu-pe. I was disappointed by learning that there was no water as yet in the canal. This circumstance left me no other choice, than to go to Siang-yang either by way of Yo-chau and Sha-si, or by way of Hankow. I chose the latter route which will take less time to perform. It is a tedious journey, through this level country, but unavoidable for reaching Honan and Shan-si, which are intended to be my next field of research.

I hope the complete change of the order in which I first intended to explore various provinces will have created no dissatisfaction. If this should however be the case, I trust that the amount of useful information which I hope I shall have collected, apart from geological observations ,in the first four months of this year (the same time which it would have taken me on the previously contemplated southern route to reach Sze-chuen) will justify my present plan. As regards myself, I am extremely satisfied with the change, as it will give me an opportunity of seeing every province in a season well adapted for it. On the southern route, I would now be in the western portion of Kwang-se, with a good chance of being obliged to return to Canton.

My journey has been, on the whole, satisfactory and pleasant. People in Kwang-tung are civil to foreigners, and I have no reason to complain seriously of those of Hunan. It is true that travelling by land in this province requires more care and constant watchfulness than it does in those provinces I had previously visited. There is a good class of people largely represented in Hunan. The bad reception which foreigners have met is due, chiefly, to the existence of a class of rough characters which are met with everywhere in China, but probably in few provinces in equal number with Hunan. Though cowards when met singly, they wield power in exciting a crowd; and it is not difficult for them to succeed, as the inhabitants of Hunan are exceedingly superstitious (Fung-shui, for instance, which are little else but a farce in the north-eastern provinces, exert here their full sway). Threats of beating and killing the foreign devils are frequently heard. There is a long interval between threats and acts with Chinese, if they fear resistance; but a traveller has to use unremitting care to keep down the excitement of the mob. I hardly have met in any province with a ruder set than the people in the coal-mining places of Hunan; foreign residents would have for a long time a dangerous position among them. On the other hand, the cleanliness, order, and industry of the people generally, and the great number of well educated and well behaved individuals cannot fail to impress a traveller favourably, and this circumstance makes up, in some measure, for any unpleasant experiences he may have previously made.

I am under obligations to the mandarins of this province, who have treated me invariably with civility and afforded me help when I needed it. This is the more to be appreciated as their power appears to be very limited in this province, and the people in many places seem to govern their mandarins. All the way down from Siang-tan, without the least solicitation on my part, I have been accompanied, for the sake of safety, by an Imperial gunboat. The reasons were, the supposed danger from robbers consequent on the poverty caused by the floods of last year in these lower regions, and the known animosity of the mob against foreigners. The rude treatment the officers of your expedition experienced at Yo-chau is still kept fresh in memory. It would probably be difficult to find in the Chinese army more amiable officers than those who were appointed at every gunboat station to accompany me. Far from restraining my steps, they even encouraged visits to the large cities, and procured me the great comfort of keeping my boat always clear of curious spectators.

In obedience to my instructions, I beg to lay now before you some preliminary notes regarding the country through which I passed.

The North-river.—The Canton North-river (including its branch, the Wu-shui) does not show the province of Kwang-tung to advantage. It crosses in succession, three mountain ranges of from 2,000 to 3,500 feet elevation, which trend W.S.W., to E.N.E. The first is north of Tsing-yuen-hien, the third north of Lo-chang-hien. The river breaks through them in steep gorges with precipitous walls. They are separated by eqally directed tracts of low hills and limestone cliffs, which enclose some fertile plains of small extent. Shau-chau-fu is situated between the second and third ranges. The existence of *coal-mines* in that region has been known for a long time. Little attention has been paid to them, on account of the inferior quality of coal brought for sale to Canton. But, as work appears to be confined to those places where the coal-beds were found cropping out on the hill sides,

and is more superficial than in most other coal-mining districts that have come under my observation in China, and in view of the absence of any known coal-field of value in the neighbourhood of Canton, I think that that of Shau-chau-fu is well worthy of a detailed examination. There are several workable coal-beds, their position is but little disturbed, and the quality of some of the coal is by no means bad. It is not improbable that the establishment of deep mining would be a means of supplying Canton and Hongkong with a tolerably fair fuel at a cheap price.

The city of *Shau-chau-fu* is situated at the place of confluence of two rivers, one of which descends from the Meiling-pass and Nan-hiung-chau, and carries the traffic to and from Kiangsi, while the other (to Wu-shui) has its sources in Hunan, and forms part of the ancient highroad for the trade of Hunan and a great portion of western and central China with Canton. Yet, Shau-chau-fu is an unimportant place as regards commerce, and nothing but a convenient customs station.

With the *Tung-lo-ling*, the range north of Lo-chang, and still lying in the province of Kwang-tung, the last continuous mountain range is crossed between Canton and the Tung-ting lake. The headwaters of the Wu-shui, as well as those of some affluents of the Siang-kiang, are situated in a hilly region north of it. The pass between both, here known as *Chĕ-ling* (called the little or lesser Meiling in some European books), has an altitude of probably less than one thousand feet above the level of the sea. The great highroad which crosses it in a length of thirty miles, is slightly undulating.

The fact that the prominent range of the Tung-lo-ling (a portion of the Nan-ling ranges) does not form the watershed between Kwangtung and Hunan, but is intersected by a navigable river having its sources north of it, is an important circumstance in the history of Chinese commerce, as it gave origin to one of the chief routes of commerce in the Empire. Hopes have been entertained, that this same route would be practicable for a future railroad to connect Canton with the coal-fields of Hunan. But the prospects for such an enterprise are dim. The precipitous gorges in which the north river breaks through the three ranges are a formidable obstacle, and unless another and better route is found, which is far from probable, the prospective profits of an easy connection with Hunan must be enormous, in order to justify the great expense of laying a railroad track along the north river and the Wu-shui.*

The traffic over the Chĕ-ling pass, though said to be a fraction of what it was before the establishing of steamers on the Yang-tse, is still surprisingly large. There is a crowding of pack animals and coolies going either way.

It is a well-known fact that about 120 miles west of the Chĕ-ling pass, Hunan is connected with Kwang-si by a continuous water communication kept up practically by means of gates. The existence of a low bridge is said to be the only obstacle preventing boats which stand high out of the water from passing from one province to the other; but small boats can proceed from the Tung-ting lake to Canton. Yet it seems, that that apparently convenient passage is not used to any notable extent, and not at all for the transportation of goods to Canton. The probable reason is, either local squeezes, or the dangers of navigation of the Kweilin river. The cost of the transportation alone, of goods from Hunan to Canton, must certainly be greater via the Chĕ-ling pass than via Kweilin.

Province of Hunan.—I passed no important place in Hunan, until I reached Siang-tan; and as, in addition to my own observations, I attempted to gather general information in regard to the province, on my journey as well as in that great commercial emporium, I leave my itinerary with the Chĕ-ling pass and will try to condense more systematically some notes regarding Hunan, selecting such as may be of general interest.

You will receive, together with this letter, a map of the province of Hunan, which I drew from the Chinese original, reducing it to a convenient scale (1 inch=15 geographical miles), and marking on it various items of information. I did not make any corrections on the Chinese original, though the route-maps which I am making as I go along would have given me an opportunity of doing so. If the Committee consider the map sufficiently interesting, I would respectfully request to have a copy of it taken, and to return me the original; as, together with such additions as I may be able to make hereafter, and with the maps I have made of other provinces, it may serve hereafter as a basis for publication. I think that a series of maps of the provinces of China, somewhat in the style of the one I send you, would be useful to the Chamber, because the information noted down on them in a conspicuous form may be from time to time enlarged by competent travellers.†

I begin with some geographical notes:—

Area of Hunan.—The area of the province of Hunan is, according to the Chinese map, 62,000 geographical, or nearly 84,000 statute square miles. Lobscheid gives 70,000.

Rivers.—The basin of Hunan, the boundaries of which nearly coincide with those of the

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* I have read subsequently after my arrival at Hankow, the report of Dr. Dickson on his journey over the same route which I have taken (Journal North-China Bra. Rl. As. Soc. 1864), and I see that he speaks in emphatic terms of the facilities of building a railroad from Canton to Hunan. The difficulty of the Tsing-yuen gorge which he mentions does not exist, as it can be easily evaded by taking a more direct route than the river. But the difficulty of crossing the Lo-chang range or Tung-lo-ling is certainly much under-rated by Dr. Dickson.

† You will find the spelling of the names on the map generally in accordance with that used in Lobscheid's "Topography of China." I have, however, substituted *t'sh* for the English *ch*. Geographical names on maps should be spelled so as to be easily read by every one. *T'sh* can only be read in one way, while the pronunciation of *ch* is different in nearly every language. In my letters I adhere of course to the *ch*, to which English readers are accustomed. I make no apologies on behalf of the rude technical execution of the map. You are aware that a Chinese boat does not offer much convenience for that sort of work.

province, is drained by four rivers, which empty into Tung-ting lake. They are from east to west:

1st.—*The Siang river*, navigable high up in its course by boats loading 450 piculs, while all its numerous and extensive ramifications are accessible, partly to the same craft and partly to smaller boats, for considerable distances. Through these affluents, and by low mountain passes situated in the regions of their respective head-waters, it offers easy communication with Kiang-si to the east, Kwang-tung and Kwang-si to the south, and the basin of the Tsz' river to the west. The area of its basin is 28,800 geographical or 39,000 statute square miles.

2nd.—*The Tsz' river*, navigable only by the smallest kind of boats, which must be pulled up frightful rapids. The term "T'an-ho," (stream of rapids) is especially applied to it as a name. Its basin covers an area of 7,500 geographical, or about 10,000 statute square miles, and offers easy connections by land with that of the Siang-kiang to the east and south, upon which it is mainly dependent for supplies and the sale of its own productions; while more difficult, because longer, land routes connect it with the basin of the Yuen-kiang to the west.

3rd.—*The Yuen river*, a large river with extensive ramifications, some of which have their headwaters in Kwei-chau. Its navigation is throughout difficult and dangerous. Rapids commence 120 li above Chang-te-fu, and continue all along the course of the river and its affluents. Boats leaving Chang-te-fu do not carry more than sixty piculs. At the mart of Hong-kia, little more than midway between Chang-te-fu and Yuen-chau-fu, and about 600 li distant from the former place, goods are put on smaller boats, drawing no more than sixteen inches and loading thirty piculs. These ascend the main river to Wang-ping-chau, situated near its source in Kwei-chau. All the larger affluents are navigated, but most of them by boats loading only ten piculs. Freight is consequently expensive, a cargo of 60 piculs costing 40,000 cash from Chang-te-fu to Yuen-chau-fu, a distance of 1,000 li, or more than Tls. 6 for a distance of less than 300 miles. The road overland is much shorter, but the expense of freight by it is double. On the Siang river, freight is about one seventh of what it costs on the Yuen river. The basin of the Yuen river has an area of 26,100 geographical, or 34,300 statute square miles, of which 6,650 geographical (22,500 statute) are situated in Hunan (including a small corner of Sze-chuen), and 9,450 geographical (12,500 statute) in Kwei-chau; this latter portion is partly inhabited by independent Miao-tse. From this basin there are inconvenient passages by land to the Tsz'-kiang basin to the east, and the centre of Kwei-chau to the west, while to the northwest it is connected by the important, but inconvenient and expensive Yu-yang route with the province of Sze-chuen.

4th.—*The Ling-kiang*, navigable only in its lowest portion. Its area is 6,000 geographical or 8,000 statute square miles, and derives importance chiefly through the position on its head waters of the tea-district of Ho-fung-chau. But this belongs to the province of Hu-pè, and its produce is, as I see from your own report on the Upper Yang-tse, carried across the hills to I-tu-hien on the Yang-tse, not benefitting the trade of Hunan.

Relative position of chief places of commerce.

It will now be seen at a glance, what makes *Siang-tan* such an important centre of trade, notwithstanding its situation a good distance up one of the four rivers of the province. With reference to the Tung-ting lake and the Yang-tse, it offers only this slight advantage over Chang-te-fu, that in winter it can be reached from Yo-chau, by somewhat larger vessels than Chan-te-fu. But the chief advantage of its situation is, that it commands the basin of the Siang-river, the easiest of approach, the largest, and by far the most important of the four basins of the province; besides, the passages to Kiang-si, and those to the neighbouring populous basin of the Tsz' river.

Siang-tan is from these reasons one of the chief commercial places in China. The number of its inhabitants is said to be one million. The city extends about three miles along the left bank of the Siang-kiang and is lined on the river side with a forest of masts. Its depth from the river is said to be five li. It consists almost altogether of suburbs, which are the seat of the trade; the city walls enclose the yamêns, but no great commerce is done within them. It is a much larger city than *Chang-sha-fu*, and more populous, though the provincial capital boasts of a larger space enclosed within its walls. Third in order among the cities of Hunan is *Chang-te-fu*. Although a considerable trading place, it is said to be far inferior to Siang-tan, as regards size, population and commercial importance. Besides some districts on the Ling-kiang, it commands the trade of Yuen-kiang, which rivals the Siang-kiang, as regards extent of ramifications and area of basin; but the importance of this river is by no means proportionate to the size of its basin, and it commands no passages to any largely consuming or producing regions, excepting that to Sze-chuen. Regarding this, however, the route from Fu-chau (Sze-chuen) to Chang-te-fu (Hunan) is only a portion of the transit route of nearly all goods passing over it; most of them must reach Siang-tan before they can be distributed to their places of final destination. Besides these various causes of the superior importance of Siang-tan, the list of products which I subjoin will show, that nearly all valuable articles of export of Hunan are derived from the eastern half of the province.

I may mention in connection with this subject, that I was told the chief business of Siang-tan was that of banking. And if the position of Siang-tan is considered as connecting the commercial intercourse between the larger portion of western and central China with the southern provinces, it is indeed evident that there is no place equally favourably situated for controlling financial matters also between distant portions of the empire. The business is here, too, chiefly in the hands of Shan-si men, besides some from Shan-tung and Chi-li.

Formation of Surface.

Hunan is eminently a country of hills. It contains apparently some groups of mountains of a few thousand feet elevation, and trending in well defined directions, but it seems that they assume in no instance the form of continuous high mountain-ranges, in relation to the present general level of the country. The area of alluvial soil, too, is very limited. The only plain of any extent is around the Tung-ting lake, but even this extends little beyond the area covered by water in summer.

The surface of that portion of Hunan through which I travelled is composed from the southern boundary of the province to north of Hang-chau-fu, pre-eminently of soft red sand stone more recent in age than the coal-formation. It gives origin to exquisitely picturesque scenery, when cut up to the depth of a few hundred feet by a net of water-courses, which are so many narrow gorges bounded by vertical or overhanging walls. The contrast of a luxuriant vegetation with the brick-red colour of the rocks contributes to create an endless variety of beautiful sights. These regions are, however, as a rule, thinly inhabited and little productive. The same formation constitutes, around Lai-yang and Hang-chau-fu, a low, rolling country, with patches of alluvial soil between numberless slight elevations. These attain, in places, an extent of a few square miles, and are fertile, yielding rice and various kinds of grain, besides hemp and Tobacco. The summits of mountain-ranges that existed at the time of the deposition of these red sand stones, protrude from between the hills composed of the more modern rocks. Besides some older rocks, the mountain-ranges are chiefly composed of the coal formations, which, besides, constitute extensive hilly regions. These hills are well wooded, and covered with large plantations of the tea-oil shrub and tea. They leave little room for agriculture, but the fertile soil yielded by the rocks of the coal-measures renders the narrow bottoms of the valleys especially adapted for the cultivation of rice.

It appears, that the character of surface-formation which I have here described prevails over the greater portion of southern and western Hunan, though more ancient formations take probably the place of the coal-measures more and more as one approaches the south western corner of the province.

North of Heng-chau-fu, the country continues hilly, but detached groups of higher mountains are more frequent than south of that city. Among them is the celebrated *Hang-shan*, one of the five sacred mountains of China, and known as the place of the original tablet of Yu. Its elevation is about 3,000 feet It appears to form part of an ancient mountain-range, stretching from west-south-west to east-north-east, whose summits only are visible at present, but which was formerly of some importance, as it formed the northern rim of the basin in which the coal-measures before described and the overlying red sand stones were deposited. A series of coal-bearing strata, differing in age and character from those first mentioned, take part in its structure, and by their hardness give origin to dangerous cliffs and rapids in the Siang river. The same formations of which these mountains are composed, continue to prevail from here all the way to the Yangtse. Granite is one of them, but occurs only in a few places. It is hewn, at *Kin-tse-wan*, below Chang-sha, into slabs and rice-mortars which are largely exported to the lower countries. Sand stones and conglomerates are the predominating rocks. They form barren hills ; while softer sand stone bears Tea-plantations, and strata of argillite have afforded means by the decomposition of the rock, for the establishment of large potteries, those of *Tung-kwan-yan*, 19 miles below Chang-sha-fu, being the most celebrated. A great number of glazed tiles, of all colours, and of the most fantastic patterns, for adorning temples and private buildings, are made here.

The soil between these hills is, as a rule, sandy and not fertile. Lime, for the purpose of manuring it, is burnt in great quantity at various places along the river. The occurence of limestone is quite subordinate, though its out-croppings along the river are numerous.

The only portions of Hunan which are probably more mountainous than those here described are the far northwest and southwest.

Products of Hunan.

Hunan exports chiefly raw produce. Manufactures of any kind are in a low stage, and the province has to import nearly all the manufactured goods it requires. But as the country is hilly, and the Chinese make little use of sloping ground, excepting where they can either terrace it and cultivate rice, or where they plant the tea-shrub or tea-oil shrub, the quantity of raw vegetable produce exported is comparatively small, and that of animal production is nil.

It is noteworthy that, notwithstanding an exceedingly favourable climate, Hunan produces no *silk*, very little *sugar* and no *opium*, excepting a very small quantity grown near the frontier of Kwei-chau. It lacks, therefore, some of the chief sources of wealth which neighbouring provinces, though to all appearance no more advantageously situated, possess. It is difficult to understand the causes of this deficiency. It may be that the climate is unfavourable for the cultivation of the poppy, and the level ground may be too limited in extent to admit of planting much beyond what is needed for the daily food of the people. Chinese like to be safe in regard to this, and will generally prefer to supply first their rice and other grain, before they seek to plant those crops which are not for their direct use, but by the sale of which they may acquire the funds for purchasing their food.

Tea has to make up for these deficiencies. It ranks first in value among the articles of export. That which is sent to Hankow is made east and west of Siang-tan, in *Li-lin-hien*, *Liu-yang-hien*, and *Ping-kiang-hien* to the east, *Siang-hiang-hien*, *Sin-hwa-hien*, and *Ngan-*

hwa-hien to the west. Ping-kiang produces most, and Ngan-hwa the best quality of Tea. The prepared leaf is brought in cotton bags containing from 70 to 100 catties to Siangtan, where it is classified, put in boxes and made up into chops by the large dealers. Another tea-district is *Ki-yang-hien* in Hang-chau-fu. The tea from this place is exported both to Hankow and Canton, while that grown in a third district, the region adjoining the province of Kwang-tung, goes all to Canton. Western Hunan produces no tea.

Hemp is among the chief articles of export of Hunan. The market for it is Fu-shan-hien near Canton. It is even carried as far as Fo-kien. The price of Tsing-ma is Tls. 5 to 6, that of Pe-ma Tls. 6 to 7 per picul. The best (Lao-pe-ma) is grown in the district of Ping-kiang, and is said to be sold as high as Tls. 10 per picul.

Cotton.—An amount not sufficient for home consumption is grown in Hunan. Hu-pe supplies largely above the quantity required to make up the balance. In consequence, a good deal of cotton grown near Chang-te-fu is exported to Sze-chuen, and some Hu-pe cotton is re-exported to the same province. The price has varied from Tls. 15 to Tls. 30, and is now Tls. 16 to 19.

Rice is grown throughout the province in sufficient quantity for home consumption, and a great deal is exported to Hankau and the lower Yang-tse from the regions adjoining the Tung-ting lake. It is, besides medicine, the only article of export from the upper portion of the Yuen-kiang-basin, though only in good years. Its present price on the Tung-ting lake is a little over 2,000 cash per picul, which is about double the usual standard, and more is exported this year. Its present price at Siangtan is 2,700 cash per picul.

Paper is the only manufactured article exported from Hunan. Most of it goes by way of the Han-river (Fan-ching) to Honan and Shansi. Only the inferior kinds of yellow joss-paper, made of bamboo and rice-straw, are produced in Hunan. The profits to the province at large are probably small, as all writing paper is imported, chiefly from Fokien.

Tobacco is grown in Hunan, but it is of inferior flavour. It sells at Tls. 1.2.5 to Tls. 10 per picul, and is exported both to Kwangtung and Hankau. Better qualities are imported, chiefly from Fokien; the best from that province sells as high as 640 cash per catty.

Tea-oil is one of the staples of Hunan, and is manufactured in great quantity throughout the province, chiefly in the south. Its price at Siangtan is Tls. 7.5.0 per picul. Most of it is exported to Canton. Groundnut-oil (Hwasin-yu), though likewise produced in large quantity, is not an article of export. Tung-oil is imported from Sze-chuen, though a small quantity of it is made in south-eastern Hunan.

Coal: this is the most important of the mineral products of Hunan. The whole of south-eastern Hunan may not unjustly be called one great coal-field, although the coal-formation is far from forming the surface-rocks uninterruptedly. It is, without exception, the greatest coal-field that has hitherto come under my observation in China. It extends, according to the information I gathered in addition to my own observations, from the northern slope of the Nan-ling to near Siang-tan, that is, through upwards of two degrees of latitude and about the same of longitude. The total area comprises about 16,200 geographical or 21,700 statute square miles. But, unfortunately, a great portion of this area, probably more than one half of it, is covered by those sediments of many thousand feet in thickness mentioned before as being more recent in age than the coal formation, while a small proportion of it only is occupied by the more ancient rocks. Yet, the coal measures themselves are visible in extensive regions. The stratification is ordinarily much disturbed, a fact which has in many localities influenced disadvantageously the position and quatity of the coal-beds.

From a geological as well as from a practical point of view the coal-field must be divided into two nearly equal portions, which may be called the Lui-river coal-field and the Siang-river coal-field. The former yields anthracite, the latter bituminous coal. The coal-measures are different in character and in age in the two regions.

1st.—*The Lui-river coal-field.*—The southernmost mines of this coal-field are already met with on the head-waters of the Canton north river, near *I-chang-hien* and *Lin-wa-hien*. Next to the north follows a broad belt of mining districts, marked by the following places: *Chin-chau*, *Kwei-yang-chau*, *Kwei-yang-hien*, *Kwei-tung-hien* and *Hing-ning-hien*. A great deal of coal is mined here for local use, but scarcely any of it is exported, partly because some of those remote regions are not accessible by water, and partly because the coal is of an inferior quality. If once seen it can be immediately recognized, as it is alike in all these southern places, and unlike any other coal coming from the west of Hunan. Though all anthracite, it is exceedingly soft and friable; large pieces crumble into mere dust by a slight blow with the hammer. If left to itself, it parts into small shelly pieces, caused by the existence of rounded planes of attrition, which exhibit a remarkably bright lustre, resembling that of plumbago. These unfavourable properties of the coal are undoubtedly due to the crushing action to which it was exposed during the slow process of the folding of the strata in which it is enclosed. The disturbances are so great that there is little prospect of ever finding here a good kind of coal.

The most important region is situated on both sides of the Lui-river (Lui-ho), between *Yung-hing-hien* and a few miles north of *Lui-yang-hien*. The coal-formation rests here on the flanks of a north and south range made up of more ancient formations, its strata dipping, with great regularity, about 45 degrees off from that range, on either side of it. The coal-beds are intercalated, in groups, and at various levels, between a series of sand stones and argillites which have an aggregate thickness of at least five thousand feet. The inclined position of the strata is favourable for disclosing the various coal-beds to view, and makes mining tolerably easy. The situation is no less advantageous; many mines are worked close to the river side and at little distances from it. All the coal in this district is anthracite. In those mines situated farthest up the river, near Yung-hing-hien, it still

resembles in character that described from the Chin-chau and other districts. Proceeding north, the coal gradually improves in quality. At the chief selling places: Lui-pa-kou, Tan-chau, Whang-i-kang, Tsing-sui-pu and Sz-mi-chau situated respectively 7, 12, 15, 17, 28, geogr. miles, by water, below Yung-hing; distance from Yung-hing to Lui-yang 38 geogr. m. by water, 25 m. direct, some good anthracite may be seen. But the best is raised from some new mines a few miles east and north-east of Lui-yang just before the whole formation disappears under the overlying red sand stone. This last portion of the coal-field would well repay the trouble of a detailed examination, which I was prevented from making at the time by misrepresentations connected with the then approaching Chinese New year. The character of the coal formation is the same as farther south; the coal is better, yet the mines are smaller, probably because the difficulties in the way of Chinese mining are greater.

The "Coal of Lui-yang," by which name the anthracite of the entire region described is known in the lower country, is mostly of great purity, black colour, and concoidal fracture. But it lacks solidity, and the proportion of lump coal to small is no more than one-fifth to one-tenth at most mines. The superiority of the northernmost mines of the district is chiefly due to the circumstance that most of the coal is raised from the mines in fine solid lumps. I think it will compare favourably with the best kinds of anthracite known.

The original price of Lui-yang Coal is from 80 to 100 cash per picul (Tl. 0.8 to Tl. 1 per ton) for small, and 140 to 160 cash (Tls. 1.4 to Tls. 1.6 per ton) for lump, put on board boat. The distance from Yung-hing to Siang-tan, by water, is 196 miles (1000 Hunan-li), and from here to Hankau 237 miles. Freight is remarkably cheap. It is for a cargo of upwards of 400 piculs, from the mines to Siang-tan, 30,000 cash, and from there to Hankau 36,000 making a total of 66,000 cash for say 400 piculs, or 165 cash per picul, or Tls. 1.6.5 per ton of 16 piculs, for a distance of 433 geographical miles. Taking the original price of lumps 150 cash per picul, the best Lui-yang anthracite can therefore be laid down at Hankau for a trifle over Tls. 3.1.5. No transit dues have to be paid, excepting 16 cash per picul near Yo-chau. It is, of course, desirable that this price should be reduced to its lowest possible figure, and coal be procured of the best possible quality. Any prospect of a reduction of freight is entirely out of the question. No steamer and no railroad would carry coal for so low an amount as the boatmen of Hunan do, and in China there are few instances of so low a rate of freight. It is at the mines that an improvement must be looked for. They are at present imperfectly worked. The abundance of coal croppings and the ease of following a coal-bed down by an inclined shaft cause a great many mines to be opened in succession, and little trouble to be taken to continue work to great depth. Nowhere did I find it so difficult to ascertain the depth of the mines, one or two li being the figure usually given. I descended in some shafts, but no more than 60 or 80 feet, as it proved to be very unsafe to go to the bottom. It appears that few mines are worked to a greater depth than 180 to 200 feet on the incline. It may be confidently expected, that deep mining would secure an improvement of the coal in that direction where it is most needed, namely as regards increase of solidity. The country is admirably adapted for draining the mines by tunnels to the depth of several hundred feet. The construction of such adits in the soft rock of the country, and with cheap labour, would be inexpensive. The chief conditions required for extensive and cheap mining are therefore present, and the time will probably come when the best anthracite will be sold at Lui-yang for a cheaper price than is paid at present for the lowest kind of dust coal which is mixed with clay to render it fit for use. I forgot to mention the thickness of the coal-beds, which is moderate, varying from 3 to 6 feet. But this want is made up by the number of coal-beds that can be worked in most places by one single set of mining works.

The amount of Lui-yang extracted Coal is already large. It is used in all the places down the Siang river. Most of it is carried to Hankau, where some, considered a trifling amount by the Siangtan Coal dealers, is sold to the foreign steamers. Some is carried as far as Kiukiang and Nanking. Great complaint is made of the heavy dues to which it is subjected at Kiukiang, Wuhu, and Nanking (100 cash per basket of 140 catties at each place). To get at an estimate of the present amount of Lui-yang Coal extracted, I counted approximately the number of cargo-boats I met on the Lui-ho, from Yung-hing to the place of its confluence with the Siang-kiang, a distance of 96 miles. I counted upwards of two thousand boats averaging in capacity 200 piculs of coal (the basket of coal, weighing from 140 to 160 catties, appears to be the standard measure of these cargo-boats). Going up the river, they carry merchandize for the upper country, and the bulky medicines destined for Kwangtung. Returning, they take, first, the imports from Kwangtung, whcih are not only less in value than the exports, but mostly very weighty, and require only a small proportion of the available boats. About two-thirds of them take therefore on their return trip a cargo of coal. Considering 20 days as the time required for the 2,000 boats to be replaced by an equal number of others, then at least 600,000 piculs of coaling capacity will represent the total of vessels entering and leaving the Lui-ho at its mouth every month, and 200,000 piculs will be at least the amount of coal leaving the river every month, or about 150,000 tons a year. This figure is, however, probably too low. From the few details which I have mentioned a great future may be confidently predicted for the Lui-river Coal-field, provided a market can be found for its abundance of excellent anthracite. The establishment of deep mining, the abolition of transit and other dues on coal, and the provision for cheap freight on the Yangtse, may co-operate to allow the coal to find its way to Shanghai as a permanent article of import. No other mines of good anthracite are known that are connected with Shanghai by a continuous water communication, and it is therefore not probable that the better kinds of Lui-yang Anthracite would meet with a dangerous competition from any other anthracite.

2nd.—*The Siang river coal-field.*—The lower course of the Lui river is enclosed between

rolling hills of red sand-stone. A few miles north of its confluence with the Siang river, the coal-measures reappear. But they are quite different in character from the formation in the Lui-yang coal-field, and probably precede them in age. They bear altogether *bituminous coal. Cha-ling-chau, Li-lin-hien, Siang-kiang-hien* (all of *Chang-sha-fu*), *Pau-king-fu Ki-yang-hien* in Hang-chau-fu, are the best known districts. I saw abandoned coal-mines at several places along the Siang river, but did not visit those other localities. The existence of coal-mines in Ki-yang-hien came to my knowledge a long time after I had passed Hang-chau-fu; besides the journey from there to the mines and back would have required a fortnight's time, which would probably have been ill spent. Li-lin-hien and Cha-ling-chau are of no importance, as they yield only a small quantity of an inferior dust coal. I intended visiting Siang-hiang, but as this trip must be made in winter in very small boats, and the season commenced to be exceedingly rough and cold, I gave it up; moreover the inferior quality of the Siang-hiang coal which I saw at Siangtan was not in the least encouraging for a visit under unfavourable circumstances. Very little lump is produced, nearly all dust. Most of it is made into an inferior kind of coke, which supplies some iron foundries on the Yangtse. Ki-yang-hien furnishes a slightly better coal, a very small proportion of which is in lumps. That which is mined in Pau-king-fu is very impure, full of sulphuret of iron and clayey matter. It is, besides, nearly out of reach, as the Tsz' river is said to be all but unfit for navigation.

I collected samples of coal from all these localities. They justify the very low opinion which the coal-merchants of Siangtan have of all Hunan coal other than that coming from the Lui-river. Only the circumstance, that bituminous coal is applicable to purposes for which anthracite cannot be used, secures a market for some of it. It is, for instance, largely used on the Siangkiang for burning lime, and supplies the blacksmiths far down on the Yangtse. Judging from the character of the enclosing strata at those mines which I visited, the Siang-river coal-measures belong to the same formation in which a coal-bed of inferior quality is mined a few miles off the right bank of the Yang-tze, near a place called Whang-shi-kiang, 60 miles below Hankau.

3rd. Other Coal-fields. The only other coal-field in Hunan of which I got information comprises portions of *Shin-chau-fu* and *Yuen-chau-fu*, in the western half of the province. The mines are said to be worked on a small scale, and to furnish only small coal. That from Yuen-chau-fu is used only on the Yuen-river, while a small quantity of Shin-chau-fu coal is exported. I failed to get a sample of it. I did not mark these coal-fields on the map, because their exact situation is not known to me.

It is a matter, of course, that none but the best coal from so remote a province as Hunan can find a market deserving the attention of foreigners, until the time when foreign enterprise in the interior of China shall be far advanced, and a large local consumption of coal be secured for industrial purposes. The better kinds of the Lui-yang anthracite answer this condition. But to judge from the imperfect knowledge I gathered, the same cannot be said of the bituminous coal of Hunan. All that I have seen (perhaps with the exception of some from Ki-yang) is inferior in quality to that of Lo-ping-hien on the Poyang lake, and incomparably worse situated. The original price and the cost of transportation of the bituminous coal from various places in Hunan are, on an average, a little less than of anthracite, but the difference is not so great as to make up for their inferior qualities. An amelioration may be expected by the establishment of deeper mining; but where the Chinese do not extract any better coal than that which they bring now to market to Siang-tan it would be vain to speculate on so great an improvement as would be required for bituminous coal to compete with that coming from other places, at so distant a market as Shanghai.

If steam navigation on the Yang-tsze should be soon extended as far as I-chang, then the bituminous coal of Hunan will, of course, furnish a convenient and cheap fuel to those steamers whose boilers are not adapted for the use of anthracite. But this would be too limited a market to influence the working of the coal mines to any great extent.

Iron.—It appears that iron ore is of sparse distribution in Hunan, considering that the coal formation with which it is usually associated covers so large an area. Though argillaceous iron ore occurs more or less at nearly every mine, it is mostly not abundant enough to form an object of mining. One region only has come under my observation where there are superior and abundant deposits of iron ore. It is the country around *Chin-chau.* Great thicknesses of the strata of the coal formation are there impregnated with iron and maganese, and some fine deposits of excellent limonite (brown iron ore, here probably manganiferous) are exposed. The place offers a great opening for mining. Though situated near the southern boundary of the province, Chin-chau is adjacent to a navigable affluent of the Lui-ho, and the ore can be carried down stream at the same low rate of freight as the coal. The Chinese smelt the ore at a place between Yung-hing-hien and Lui-yang-hien, and make from it a tolerably good wrought iron which is sold, according to quality, at 2,000 and 2,400 cash per picul. This is the only instance where I have seen Chinese smelt other than magnetic iron ore.

Another deposit of iron ore mined by the Chinese is reported to be in *Pau-king-fu*, probably too, in connection with the coal-formation. This ore is exported to places on the Yangtse, where it is smelted with coke from Siang-hiang. It is to be expected that a more detailed exploration of the coal districts of Hunan will disclose the existence of other deposits of iron ore. But it is questionable whether the commercial value of the iron made from it will extend far beyond the supply of the local consumption, as there are other deposits of iron ore known in the vicinity of some of the Seaports.

Other Metals.—There is only one place in the whole province of Hunan reputed for its wealth in metals generally. It is Pe-sha-sze in Sing-ning-hien, Pau-king-fu. Besides *copper,*

which takes the first place, *silver*, *quicksilver*, *tin*, *lead*, *iron*, and *gold* are said to be produced there. The place is well known to all Hunan men. Copper and tin from Pe-sha-sze are sold and used for manufacturing purposes at Siangtan; gold is only washed in the sand of a river. I could not learn of any other place producing any of those metals, excepting iron. Quicksilver is reported to be produced in one or two other localities, but information in regard to this metal must be received with caution.

Articles of Import.

Salt, though of no commercial interest, on account of its being a government monopoly, must be mentioned as probably the most weighty article which is imported into Hunan for consumption. The northern portion of the province receives its supplies from Hankau, the south-eastern departments from Canton. During the Taiping rebellion it was imported into Siangtan both from Szechuen and Canton. The sale of salt offers some noteworthy features, inasmuch as no article of commerce increases so rapidly in price with the growing distance from the centres of supply as is the case with salt. The arbitrary price put upon it by the government amounts in fact to the same as if this commodity were encumbered by transit dues and squeezes tenfold as heavy as those which are levied on articles of luxury. The price of salt at Canton is $ 1 per pecul. With the addition of freight alone it could be delivered at Siangtan for less than $ 2. But going up the North river, its price increases with every customs' station that is passed. After having gone through six of these in a distance of 650 li, it is sold at Lo-chang-hien, the last city in Kwangtung, at Tls. 2 per picul; 150 li farther on it reaches I-chang-hien, the first city in Hunan, and, after a transportation of ninety li by land, the City of Chinchau, where the price is 5,000 cash per picul. At Yung-hing-hien, 37 miles down the Lui-river, it is sold at 6,500 cash. If the price increased steadily at this rate, it would reach at Siangtan a figure above the actual selling price at that place, which is 7,000 cash per picul. Salt must be imported into Siangtan via Hankau in order to enable the Government to sell it at this comparatively cheap price-

Foreign goods are almost altogether imported from Hankow, a small quantity taking still as of old the longer route from Canton to Siangtan. This place appears to provide nearly the whole province. If transit dues and local squeezes were abolished, there is no doubt that southern Hunan would be supplied with foreign goods from Canton. Transit passes are a complete protection on the journey from Hankow to Siangtan, but none at all, as I was told, on the route from Canton to Hunan.

Opium is chiefly imported from Hankau. That from Szechuen is not liked and little used, while Kweichau opium is preferred, and said to figure a little more largely in the trade. I saw less of opium smoking in Hunan than I did in the northern provinces. I was told that all retainers of mandarins who were in the habit of smoking opium have been dismissed throughout the province. None is said to be used by the Imperial soldiers.

Silk is a considerable article of importation. It is supplied both from Szechuen and Su-chau.

Sugar.—The main supply is from Canton, chiefly white and brown. A small proportion is imported from Szechuen and Fokien.

I have already mentioned the importation of the finer kinds of *Tobacco* and *Paper* from Fokien, and of *Cotton* from Hu-pe. *Tung-oil* and *White Wax* both from Szechuen are also to be mentioned, and no inconsiderable item appears to be the importation of "Kwang-ho" or Canton goods, comprising all kinds of manufactured and fancy articles and including even foreign goods. Fans, candies, fruit, marriage presents, embroidery, carving etc., figure under this head.

Roads of Commerce.

A review of the trade of Hunan shows, that it takes chiefly six directions: 1st, *to Hankow and the lower Yangtse.* Exports: tea, coal, rice, hemp, tobacco, &c. Imports: foreign goods, salt, cotton, silk, opium. Freight to Hankow is from 80 to 90 cash per picul. There is a great deal of direct trade to Kiukiang, Wuhu, Nanking, Shanghai, and chiefly Chinkiang.

2nd.—*To Fan-ching on the Han river*, a centre of the commerce with northern Hu-pe, Honan, Shansi and Shensi. I did not collect particulars regarding the trade by that route. A great deal of paper is exported by it.

3rd.—*To Fokien.* Export: hemp. Imports: tobacco, sugar, writing-paper. The route is direct, via Kiangsi, by navigable affluents of the Siang, Kia and Min rivers.

4th.—*To Canton.* Exports: tea, hemp, tea-oil, paper. Imports: salt for the southern departments, sugar, and a variety of manufactured goods. The road is up the Siang and Lui rivers, to a small place Whang-yan-ping, 215 miles from Siangtan, thence up a small affluent of the Lui-ho (18m.) to Chin-chau. Boats are changed at Whang-yan-ping, those going to Chin-chau loading only 30 or 40 piculs. After having crossed the Chĕ-ing-pass, very small boats are taken from I-chang-hien to Ping-shi (descending a small affluent of the Wu-shui river) larger ones from there to Lo-chang-hien, and good size cargo-boats, loading at least 300 piculs, from there to Canton. The entire distance on this route from Siangtan to Canton is, according to my route surveys, 549 geographical miles.

The cost of freight per picul is as follows: from Siangtan to Chin-chau, 238m. (1,200 Hunan li), 90 cash; from Chin-chau to I-chang-hien 30m. by land, the standard rate is 600 cash per picul; the price varies according to the ratio of the quantity of goods ready for transport to the available number of coolies. From I-chang to Canton, finally, a distance of 286 miles, freight is about 120 cash per picul. The total amount, from Siangtan to

Canton, is therefore about 870 cash per picul, or Tls. 8.1.0 per ton. I have already mentioned, in connection with the salt trade, the great number of customs stations passed on this route; some twenty, more or less.

5th.—*To Kwei-ling-fu and Kwang-si.* I am not informed about this trade, which is small.

6th.—*To Szechuen.* The two roads to Sze-chuen, the first going either by way of the Tai-ping canal and the Yangtse (summer route), or by way of Yo-chau and the Yangtse (winter route); the second, by way of Chang-te-fu, Shinchau-fu, Yu-yang-chau and Fu-chau, are said to be in use in about equal proportion. Exports: none of the produce of Hunan, excepting some Chang-te-fu cotton. Imports: silk, sugar, tung-oil, white wax, opium. I have marked on the map a road leading entirely by land, through Tsz'-li-hien, Yung-ting-hien, Lung-shan-hien, Laifung-hien, Kien-kiang-hien to Pang-shui-hien, whence boats are taken, down the Kien-kiang to Fuchau in Szechuen. It is taken by travellers, and those merchants who carry valuable goods in a small compass.

Another ancient and interesting trade road must be mentioned, which has, however, fallen into disuse of late years. It is that *to Kweichau and Yünnan.* It went up the Yuen-river to Yuen-chau-fu and Wung-ping-tshau, which is the head of navigation, thence across several mountain passes to Kwei-yang-chau, and on to Yünnan. Copper, quicksilver, tin and lead from Yünnan and Kwei-chau were carried by that road through Hunan to the lower Yangtse and Canton, while silk and "Canton goods" (including foreign manufactures) were taken back in return. I learned also of an embassy, consisting of upwards of one hundred men, from the country of the "Mang-tse," reported to be situated 2,000 li "beyond Yünnan," which went twenty years ago, with tribute to Peking, and took this road in coming and returning. The trade with Kwei-chau came to a standstill seven or eight years ago, when the Miau-tse took possession of some Fu and Hien cities in the region of the upper Yuen-kiang, which they still occupy. Since then, the trade of Kwei-chau and Yünnan is diverted to Szechuen.

Trade in medicine.—I have omitted to mention the chief article of the trade of Siangtan, in the first place, because it is in the main a transit trade, and because I would have had to mention it on every trade route both with the exports and imports. It is *Medicine.* I was told by the merchants of Siangtan, that this city is the centre of trade in medicines for nearly the whole Empire. The drugs are imported from all quarters, and redistributed on the various commercial routes. The largest contributor, surpassing all others very far, is Szechuen. Kwei-chau, Yun-nan, Kwang-si, Kwang-tung, Hunan are next in order, and large shipments arrive from the northern provinces. When I met on the Che-ling-pass train after train of coolies and pack animals carrying big boxes carefully rendered water-proof, and I enquired what they contained, the answer was almost invariably, *Yau-tsai (medicine herbs)* from Szechuen. Large boats going south from Siangtan were loaded with nothing but these drugs. It may have been just the season for that trade, but undoubtedly the latter is of vast dimensions. And yet I heard at Siangtan, that the export of medicine to Hupe, Honan, Shansi, Shensi, Chihli, and Shantung is much larger in quantity than that going south.

The question naturally arises: what articles the Szechuen merchants purchase in return for their large imports? I learned that they buy at Siangtan a portion of the imported cotton and foreign goods. This circumstance will partly account for the great exports of foreign goods from Hankau to Siangtan, as compared with the amount of direct sales to Chungking. But making all due allowance for re-exports, there still remains a large quantity of foreign manufactures for consumption in Hunan. One of the causes of the demand for them is the considerable amount of money earned by the Hunan people; another may be found in the fact, that they were earlier acquainted with foreign goods than the inhabitants of most other provinces. The term "Canton goods," in which they are still included, though imported at present from Hankau, points to the customary receipts from there in former times. A third cause is, the scarcity of native grown cotton. Where people cannot supply their wants from the produce grown on their own fields, imported fabrics must find a more ready market, even among the agricultural population, than in those regions which are more favored.

Prosperous condition of the inhabitants.—People in eastern Hunan are, on an average, better dressed than the inhabitants of any other province I have visited. This is owing, in a great measure, to their cleanlier habits, and the desire evidently prevailing, to dress well and neatly, but no less to their general welfare. A considerable amount of money flows into the country, in return for Tea, Tea-oil, Hemp, and Coal. The large sums paid to the boatmen of Hunan, by the consumers of medicine and other transit goods in the other provinces, are another source of wealth, which is perhaps not secondary to the former as regards its influence upon the general well being, as it offers this advantage, that the money earned for freight is rapidly put in circulation.

I do not know, whether the number of so called "rich men" is greater in Hunan than it is in the north-eastern provinces, but it is certainly more conspicuous: This is the first province in which I have seen a considerable number of fine country seats owned by "rich men" who have retired from business. They invest their money in real estate, and let this to farmers for rent. In an isolated and conspicuous position, usually on the slope of a hill, and surrounded by a cluster of trees, stands the showy mansion of the owner. The existence of this kind of landed aristocracy may be the cause of the fact that Hunan furnishes a great number of mandarins in proportion to the number of its inhabitants. The young aspirants for office are instructed by private teachers, until they have passed the first examinations, when they enter Yolo-college (one of the Hanlin Colleges), opposite Chang-sha-fu, to prepare for the examination in the provincial capital. It contains more than one thousand pupils, mostly of the age of from 22 to 25. They study privately in their cells,

and have but one professor, a high mandarin. He is, however, not a teacher, but is merely consulted by the pupils when they meet with difficulties in their studies. I visited the college. It is a large compound enclosed by a wall, and containing many fine buildings, which are kept clean and in excellent repair. On the Yolo-shan, a hill at the back of the college, has stood since time immemorial a copy of the Yu-tablet. I went up to it, but failed to get a complete copy of it, as it was getting dark when I reached it. I could not repeat my visit on the following day, as my first walk to the much dreaded and very independent crowd in the Yolo college, among which there are many who have a mandarin button, had alarmed the mandarins of Chang-sha-fu. When it became known, several escorts of soldiers were sent out to protect me. I met them one by one, when I was quietly walking back. I do not consider the visit to the college by foreigners a safe enterprise, although I took my leave quite pleasantly, the students having at the time evidently not got quite over their surprise both at my visit and my polite behaviour to them. But one minute more, and the gates would have been shut upon me. Some small incidents made it quite evident how this literate class fears and hates the foreigner.

Tung-ting-lake.

I conclude this letter, which, in the leisure hours afforded by a stormy and slow passage, has grown to greater length than I anticipated, with some notes on the natural outlet of the basin of Hunan.

There was no lake to be seen when I travelled from Siangtan to Yo-chau, the channel of the Siang river being now as well defined between banks here as it is higher up, with a width varying from 200 to 1000 yards. It is joined, about eight miles above Yo-chau, by the Yuen river, which likewise continues its course as a river throughout the whole basin of the lake. The Tsi river empties into the Siang below Siang-yin-hien. Both the Siang and the Yuen have their rapids and shallows within the area of the lake itself. Boats navigating the Siang in this lowest portion of its course should draw no more than two feet of water, though thirty inches is still risked, while those going up the Yuen draw only sixteen inches. The lake bottom consists of a fine micaceous sand, which forms quicksands in the bed of the Siang. Boats getting badly aground at this season are lost, because the sand accumulates rapidly around them. These alluvial deposits slope down gradually from south to north. The banks of the Siang, which are more than 35 feet above the present water level near Siang-yin, get lower and lower as one descends the stream, and are only five or six feet high, near Yo-chau.

The formation of the lake, in the summer season, is not caused by the swelling of the rivers of Hunan. If the sea extended to Yochau and was at a level with the present state of water in the Yangtse, then no lake would be formed. It is the rising of the Yangtse, "the water coming from the sacred lakes of Szechuen," as Hunan people say, which gives origin to the formation of the lake, and would fill its basin without any contribution from the rivers of Hunan. When at its highest, the lake extends up the Siang-river as high as Siang-yin-hien. Still water continues usually beyond. At Chang-sha-fu it lasted for thirty days in 1869, and for sixty days some seven or eight years ago, but in ordinary years the river continues flowing throughout the whole summer. There is never still water at Siangtan.

As regards the Siang-river at the latter place, and beyond, I read in your report on the Upper Yangtse a statement of Dr. Dickson, that he found never less than ten feet for a distance of 300 miles above the lake, which would be equal to more than 100 miles beyond Hangchau-fu. Circumstances were very different when I descended the river in Jauuary and February. It has at this season numerous rapids and shallows, the most dangerous of which are a short distance above Siangtan. The larger Hunan coal-boats draw four feet of water when carrying a full cargo. There are places in the river, where they ground unavoidably and repeatedly on loose sand, and rely on the swiftness of the current to get off; while at other places, chiefly where there are cliffs, a narrow channel is staked off, just deep enough to let the boat pass without hindrance. It happens frequently, that there is less water in the river than at the time of my visit. The boats then either wait for a rise, or go on with only a portion of their cargo.

The Lui-ho offers less difficulties for navigation than the Siang-kiang.

Dr. Dickson travelled in May, when the water in the rivers of Hunan is generally high. During May and June it is highest, on the average. But I was told that it can never be relied upon. Heavy rains will swell the river at Siangtan within a few days from ten to twenty feet above its lowest level. It will remain high for days, sometimes for weeks, though subject to constant variations, and subside then nearly as quickly as it had risen before.

These circumstances render the Siangkiang, following its course from Yochau upwards, unfit for steam navigation beyond the extent of still water. In winter there is none of this, and the Siang river is then not accessible at all by steamers. When the lake is at its hlghest, steamers may proceed to Siang-yin, and in exceptional cases as high as Changsha, or even Siangtan. But it would be running a great risk, to make use of an occasional flood for ascending the Siang by steamer beyond Siangtan.

Siang-yin, or perhaps the mart at *Tsing-kang*, 19 miles higher up, and 72m. from Yochau, must therefore be considered as the limit of steam navigation in summer. It remains for detailed observations, to determine the length of the season during which those places will be accessible.

The Tungting-lake, although the difference of low and high water in it is considerably more than in the Poyang-lake, does not compare favorably with the latter as regards facilities for steam navigation, the limit of still and deep water on the Poyang-lake being 120 miles above its mouth, in the direction of Kin-te-chin and Loping, and the land-marks being there more distinct than they appear to be in Tung-ting-lake. It is probable that the latter

will, at high water, be navigable for steamers in all directions. But in approaching the shallow shores they will have to keep the river channels, and this will of course be more urgently required in those seasons when the water is rising or subsiding.

Foreign interests in Hunan.

It is evident that Hunan does not at present belong to the most productive provinces of China. It is inferior, in the variety and value of its products, to most of the coast provinces and to Szechuen. But the quantity of its products is capable of a greater increase than that of some other provinces which are more favoured by nature and have attained a higher industrial development. It appears that the cultivation of Tea on a large scale, in Hunan, is not of old date, but was stimulated by the foreign demand, and it is likely that its growth can be considerably increased. This is to be expected generally in regard to all that portion of vegetable produce which can be raised on sloping ground, as none, or only imperfect, use is made of the greater portion of the hills in Hunan. Chief in prospective importance, however, are undoubtedly the coal-mines; it is probable that the anthracite coal-field of south-eastern Hunan covers an area similar in extent to that of Pennsylvania. I have shown that the best mines in it are those which are the lowest on the Lui-river; that they are situated close to navigation, that mining will be easy and cheap, and that a general improvement of the coal, at least to the standard of that which is now the best, can be confidently expected. These circumstances in themselves render the opening of Hunan to foreign enterprise an important question, more so now than ever before, as after the opening of the Suez canal the want of good fuel at moderate prices will be doubly felt in the Chinese ports.

It is hardly within my province to pronounce an opinion on purely commercial matters, and I have to beg you to grant indulgence for any error in judgment, if I dare to add a few words in regard to the opening of Siangtan to foreign commerce. Important as this place is, I do not believe that it would be well adapted for the objects connected with foreign residence in the interior of China. In the first place, it is, as I have attempted to show, accessible by steamers only in exceptional and rare instances. Then, Siangtan owes its past and present commercial greatness to a concurrence of peculiar circumstances, the most important of which do not materially affect foreign interests, and will benefit those even of native merchants less and less as foreign enterprise in China progresses. It owes it, 1st to the central position of the province of Hunan; 2nd, to the fact that this province is easy of access from the north-west, north, and north-east, and that of the three passages connecting northern and southern China (Meiling, Che'ling, Kweiling) two are approached from the basin of Hunan; 3rd, to the situation of Siangtan, which commands these passages; 4th, last and least, to the circumstance that it commands the eastern, which is the most productive, portion of Hunan.

Siangtan has been for a long time the great market of foreign goods and of imports from Canton generally, for Szechuen, Kwei-chan, Hu-pe, Honan, Shan-si, Shen-si, and even for Yünnan and Kansu. *To* here they came all by one single road, *from* here they were distributed in various directions, while the produce from those same provinces converged here as towards one common centre, to take thence jointly one road to Canton. This position of Siangtan is of too old standing and too firmly established to be at once materially injured by the ascendancy of foreign means of conveyance of goods, on the Yangtse. A great portion of the trade still takes its former route through Siangtan, and the instance of the re-export of foreign goods from Siangtan to Szechuen shows, that the merchants of some provinces still adhere with tenacity to that place which has provided them for so long a time with foreign manufactures, and allow it to maintain artificially a position which it has virtually lost through the ascendancy of Hankau as the most natural place to supply those same provinces with foreign imports.

It must be expected, that the influence of quicker, if not cheaper, means of conveyance will divert the transit trade of Siangtan more and more to other channels, and finally, when railroads shall connect Szechuen with the eastern provinces, the necessity of a transit station such as Siangtan will cease for all outward bound trade, and will continue to exist only for a limited number of goods forming part of the inland traffic.

While, thus, those circumstances which chiefly contribute to render Siangtan an important commercial centre can offer no inducement to the foreign merchant, and are, moreover, bound in the course of time to diminish in importance; the object which he has chiefly in view, namely the introduction of foreign goods to an ever increasing number of customers, can, perhaps, be more perfectly attained by settling at the entrance to Tung-ting-lake. This position is the key not only to the Siang-basin, but to the whole of Hunan. It would be the natural terminus for the native boat-navigation, whose courses converge from all parts of Hunan, together with the rivers, towards the outlet of the lake; while during the season of high water, a connection by steamer could be established with various places on Tung-ting-lake. An increased exportation of anthracite, which is to be expected at some time or other, will at the same time, tend to stimulate a more extensive introduction of foreign goods to remoter portions of the province.

The valley of the Siang-kiang is well adapted for building railroads, and what we know in regard to the general configuration of the province renders it probable, that no serious obstacle will be met with in constructing a network of them within the province itself. It would be hazardous for the most keen-sighted man to undertake to foretell now, in what directions the trade-roads and the centres of trade will shift when foreign enterprise shall have advanced far enough in China to allow the introduction of this most important of all improvements. As soon as this subject is approached, the want of a thorough knowledge of this vast Empire, or even of a detailed exploration of the different provinces will be seriously felt.

Feo. F. v. Richthofen.

HANKOW, *3rd March*, 1870.

P.S.—I arrived here on February 26th, and have delayed forwarding this letter, because I expected that I would have to make some additions.

The river, at Hankow, is lower than it has been known before, the difference between its present level and the highest which it attained last summer being forty-nine feet. I repeat in connection with this subject, that the Siang river at the time of my journey was not at its lowest. The present exceptional scarcity of water in the Yangtse does therefore not affect the unfavorable results at which I have arrived regarding the possibility of steam-navigation on the Siang-river.

I enquired here particularly into the conditions of the coal trade. Large quantities of Hunan-coal are brought to Hankow, both of Luiyang anthracite and of bituminous coal, known here as hard coal, and soft or smith coal. The latter comes from various places in the Siang-river coal-field, and is throughout of that inferior description which I have mentioned as characteristic of all bituminous coal of Hunan. It ignites well, burns freely, cakes little, and is tolerably pure. It is therefore used on steamers when it can be got at what is considered a cheap price, but it is, on the whole, a fuel of too inferior value to deserve much further attention, excepting when it can be used for local purposes. The Lui-yang anthracite is greatly preferred by the engineers of foreign steamers at Hankow, though I must add that they do not fully appreciate the best kind of it, which excels in firmness and high specific gravity. It requires more air than they can supply, and does not make steam so readily as the second rate anthracite, which is of less density and very brittle. Those superior kinds are eminently adapted for sea-going steamers, with which it is not so much an object to get up steam at short notice.

It is stated to me by the agents of the river steamers, that they pay for anthracite from Tls. 6 to 8 per ton of 1,680 catties (or 1,764 catties gross weight, as five per centum is allowed for the water contained in the coal), and that the average price is Tls. 6, 5m.

According to the figures which I have given on another page, the actual expense per ton of best Lui-yang anththracite in lumps is as follows, on arrival at Hankau :—

Price at mine	150	cash per pcl.
Freight from mine to Hankau	165	,, ,,
Duty at Yo-chau	16	,, ,,
	331	,, ,,

or Tls. 3.6.5 per ton of 1,764 catties. There are coal-hongs both at Siang-tan and Hankau, which are licensed, and take probably an arbitrary profit. At the mines themselves, shippers of coal stated to me the selling price at Hankau to be 400 cash per picul. On my arrival at this place, I sent my interpreter to the coal-hongs to enquire into the price. From 430 to 460 cash per picul, or an average Tls. 4.9.2 per can was asked from him. Recapitulating these figures, we have then :

1st.—Actual expense for best coal on arrival at Hankau, Tls. 3.6 per ton.

2nd.—Price in Hankau, as stated by shippers up country, Tls. 4.4.1 per ton.

3rd.—Price asked from my interpreter at coal-hongs in Hankau, 4.9.2 per ton.

4th.—Price paid to Compradores by steam-ship companies at Hankau, for various kinds of anthracite mixed, Tls. 6.5.0.

I mention these details, because they give a remarkable illustration of the liberal scale on which profits and squeezes are drawn by a series of middle-men, and because they show, how desirable it is for those who buy native produce, to have trustworthy agents in the interior, for purchasing and shipping. As this is not the first instance in which my enquiries made in the interior of the country have proved a considerable discrepancy between the figures at which coal *can be* procured and *is* procured by foreigners, the suspicion may not be unjustified that, if reliable figures could be obtained, similar incongruities might be discovered in regard to other products which are purchased on foreign account through the medium of a number of native agents.

I will leave Hankau in two or three days, and intend to proceed by way of Fan-ching to Honan-fu. Thence I will commence a detailed exploration of the very important coal and iron regions of Honan and Shansi, I shall therefore not reach Peking before the 20th of May, perhaps later. It is my present intention to proceed, after some explorations in the vicinity of Peking, through Shensi and Kansuh to Sze-chuen. I will not return to Shanghai, in all probability, before the completion of my travels.

Although I will endeavour to write as often as an opportunity shall offer, and to mention all subjects of importance, I will probably not have the leisure to write hereafter so fully as I have done in this present letter.

FEO. F. v. RICHTHOFEN.

Amherst College No. II.

LETTER

FROM

from BARON VON RICHTHOFEN

ON THE

PROVINCE OF HUPEH.

PRINTED AT THE "SHANGHAI EVENING COURIER" OFFICE.

1870.

ON THE HAN-RIVER, NEAR FAN-CHING, PROVINCE OF HUPE.

March, 27th, 1870.

By a tolerably quick passage, of twelve days from Hankau, I arrived at a place within a day's journey from Fanching, but have been wind-bound here for three days by a heavy northerly gale. Allow me to make use of this opportunity to communicate to you a few rough notes on the Han-river. I could perhaps write more elaborately from Fanching, where I hope to collect much additional information, but will probably not find the time for it there.

The traveller who navigates Chinese rivers in summer has, in most instances, an advantage over him who travels on the same rivers in winter, at least as regards those results of personal observation which he is enabled to bring before the public. The one may be perfectly justified in writing with emphasis on the full and wide streams of water which he saw, and the facilities they offer for navigation, not excepting that by steamers. The other, though making due allowance for these results previously obtained, will yet be obliged to destroy sanguine expectations by reporting unfavourably. I experienced myself a striking illustration of the different aspects which Chinese waters may present, when I visited the Poyang lake in the seasons both of high and of low water; and another instance is afforded by the discrepancy of the statements made by Dr. Dickson and myself on the Siang-river in Hunan. With regard to the Han-river, I am again in the unfortunate position of having to describe it in the unfavourable light which it presents at low water. I must here however at once meet an objection which might be raised. It may be suspected, from the fact of the unusually low state of water in the Yangtse, that its tributaries too are lower this winter than they are usually. But this appears not to be the case as regards the Han. Besides the statements made by the people of the country, I have some circumstantial evidence. Opposite a place Li-kin-tien, near I-ching-hien, there are in the Han-river, amidst banks of sand, a few isolated flats of gravel, some of which protrude at present only from one inch to two feet above the water. The gravel next to the surface is at present washed for gold, and it undergoes this process every winter. It is therefore evident, that the difference in the level of water between this and other winters can only amount to inches, if to anything at all.

The Han-river offers this peculiarity, that it is very narrow at its mouth, and grows in width as the distance from its outlet increases. From about 200 feet at its outlet it soon attains the breadth of from 400 to 500 feet; near Shayang it reaches half a mile, then often as much as one, and even one mile and a half. Where the bed is narrow, it is filled by water only, excepting at the bends, where shoals occur on the convex sides; but where the bed is wide, it presents at this season the aspect of a broad, winding belt of sand-dunes, in which the stream meanders from side to side, often branching out into several channels.

In the place of giving a detailed description, I have put down in the following table a list of some curious figures which may help, with a few further explanations, to illustrate the nature of the Han-river and of its relation to the surrounding country. All the figures are, of course, to be taken as approximations only, being all estimated. I have not added any figures showing the depth of the water, because travelling in a boat which is moved against the current, partly by tracking and sculling, and partly by sailing, is not at all favourable for making soundings of any value.

1. Places on Han-river.	2. Distance from Hankau (in geo. miles.)*	3. Width of water chan. (in feet)†	4. Width of river-bed (in feet)†	5. Velocity of current (in miles an hour).†	6. Rise of water in summer (in feet)‡	7. Elevation of surro'ndg. country above low water (in feet).
Hankau	0	200	200	3 to 4	50	40
Tsai-tien	15	150 to 250	150 to 250	3 " 5	35	28
Sin-kou	27	200 " 300	200 " 500	2 " 4	30	3
Sien-tau-chin	76½	200 " 600	200 " 1000	1 " 3	26	1
Yo-kou	116	300 " 800	300 " 1200	½ " 2	24	4
Che-kou	133½	300 " 1000	600 " 2000	"	24	8
Ye-kia-tan	149½	300 " 1000	600 " 4000	"	24	14
Sha-yang-chin	168	300 " 1000	600 " 4000	"	22	10
Ngan-lu-fu	215	300 " 1200	1000 " 5000	"	20	15
I-ching-hien	288	300 " 1500	2000 " 9000	"	18	18

* The distances are given according to my running surveys, and refer to that route which must be taken at the present season. Above Shayang they are shorter in summer, when the sailing-course is frequently more straight than in winter.

† The figures opposite each separate name in these columns apply to that portion of the river intermediate between the respective place and the one next preceding.

‡ The figures marking the rise of the river are approximately those of 1869.

A few words will suffice to explain this table.

First, as regards the places mentioned, those below Yo-kou are situated close to the river side. Yo-kou is protected against the force of a very destructive current by a bulkhead thirty feet high and built of red sand-stone, which, however, is kept in repair only at a great expense to the inhabitants. All places higher up the river, with the exception of a few which are built on bluffs washed by the current, are situated off the banks of the Han, behind artificial embankments. The cities of Ngan-lu-fu and I-ching-hien, for instance, are five li distant from the river. A few huts built of reeds and mud, and put up for the winter only, mark, together with some Mandarin-boats, the site of those places. This fact is characteristic of the Han, and distinguishes it from the Yangtse and Siang rivers, the small and large places on both of which are built close to the water's edge.

The most important trading place on the Han, between Hankau and Fanching, is *Sha yang-chin.* I counted upwards of five hundred vessels, of an average capacity of probably no more than 150 piculs, lying at anchor here. Two miles below the place, the goods coming from Sha-si reach the Han, as you have already stated in your report on the Upper Yangtse. The water-courses of the lake Tai-peh-hu extend to within a li-and-a-half from the Han. Thence the goods are carried on horse-back and by coolies across an embankment to a sandy flat in the Han, where they are put again on boats. There were 37 boats at this place taking in cargo when I passed it. In summer there is an easier though more circuitous communication with Sha-si by way of Che-kou, a small village situated at the place of confluence with the Han of a river connecting with King-chau-fu. In winter it has not enough water to admit of any navigation.

Next in importance is *Yo-kou* or Yo-kia-kou, the port of the Tien-men district, and a mart for native cotton goods, for which that district has some repute. The fabrics are said not to be superior in quality to those from other places, but to be cheap and manufactured in large quantity. The best is made in pieces 28 Chinese feet long and 12 feet wide. Forty of these make one bale, which weighs fifty catties. The price varies between Tls. 14 and 18 per bale, and is said to be about the same as that of foreign cotton goods of similar quality, taking into account the difference in width. But it appears, from various inquiries, that the Chinese prefer the native manufacture, if prices are equal; the reason given by every one is, that they can wear it longer than foreign made cloth, and can make soles to their shoes of it when worn out, a use for which foreign cloth is unfit. Most of the cloth exported from Yo-kou is shipped up the Han, to Fanching and Lao-ho-kou.

Besides the two places mentioned, *Sin-kou* and *Sien-tau-chin* are trading-marts of some local importance, while the rest of those mentioned in the list appear to be of little significance for commerce.

The 3d, 4th, 5th, and 6th columns of the table relate more immediately to the river itself. Though merely approximations, the figures exhibit clearly the increasing width both of the river and the present water channel with the growing distance from Hankau. The total width of the river (fourth column) is taken between its natural banks. That between the artificial embankments which accompany the river to near I-ching-hien is ordinarily much larger. The width and course of the water-channel below Shayang, and a little above it, are subjected to slight variations only, as compared with the fluctuations of both between Shayang and Fanching. While at every bend the slow work of waste on the concave side and of growth on the convex side, which is well known to attend every current of water, is going on, similar agencies cause much more rapid changes in the tortuous course of the river through the sandy plains which mark its bed above Shayang. The river here is full of shoals, and navigation is difficult and dangerous. I have seen dozens of vessels badly aground, although they go usually under safe guidance. As many as fifty or a hundred vessels can be seen sailing all in one dir ction, in close single file, those whose steersmen know the river best leading the way. A slight deviation from the deep water channel will often lead on to shoals, in places where they are least suspected. Running aground is much feared, on account of the rapid accumulation of sand around the vessel. The largest cargo boats going in winter between Hankau and Fanching draw four feet. But they are few, because they need a long time to make the journey. Where the water flows along the true bank of the river, they can go with comparative safety; but where it changes from one bank to the other, or flows for some distance through the sand, parallel to the banks, a boat is sent a-head to find the best track, by sounding, as the most experienced navigator of the river does not know the constant changes in the position of the shoals.

These circumstances preclude altogether any idea of navigating the Han-river by steamers in the winter months to Fanching or beyond. In April and May the water commences to rise, and it is high during several months in summer. The rise is so considerable, that there cannot be any doubt in regard to the probability of navigating the Han river in summer with steamers of moderate size, at least as high as Lao-ho-kou, which is situated 180 li above Fanching. But they would have no easy work, partly because in those seasons when the water is rising or subsiding it will be difficult, with the most experienced pilots, to avoid the shoals above Shayang, and partly because during the season of highest water the natural banks are overflowed, and there is nothing to mark them. The banks of the Yangtse are distinctly visible, even in times of inundation, but there is for long distances not a tree or a house indicating those of the Han between Yo-kou and I-ching.

These objections apply in a far less degree to the lower portion of the Han, than to its whole course, up to Fanching. It is not improbable, that an accurate survey would show that small steamers can ascend the Han for a little distance, say to Sien-tau-chin or even Yo-kou, during the winter months, provided they have passed a bar which is said to obstruct the

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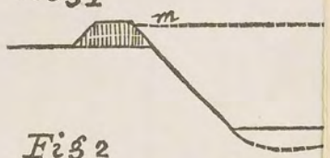

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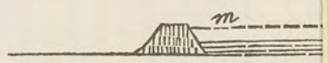

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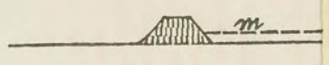

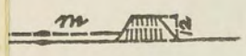

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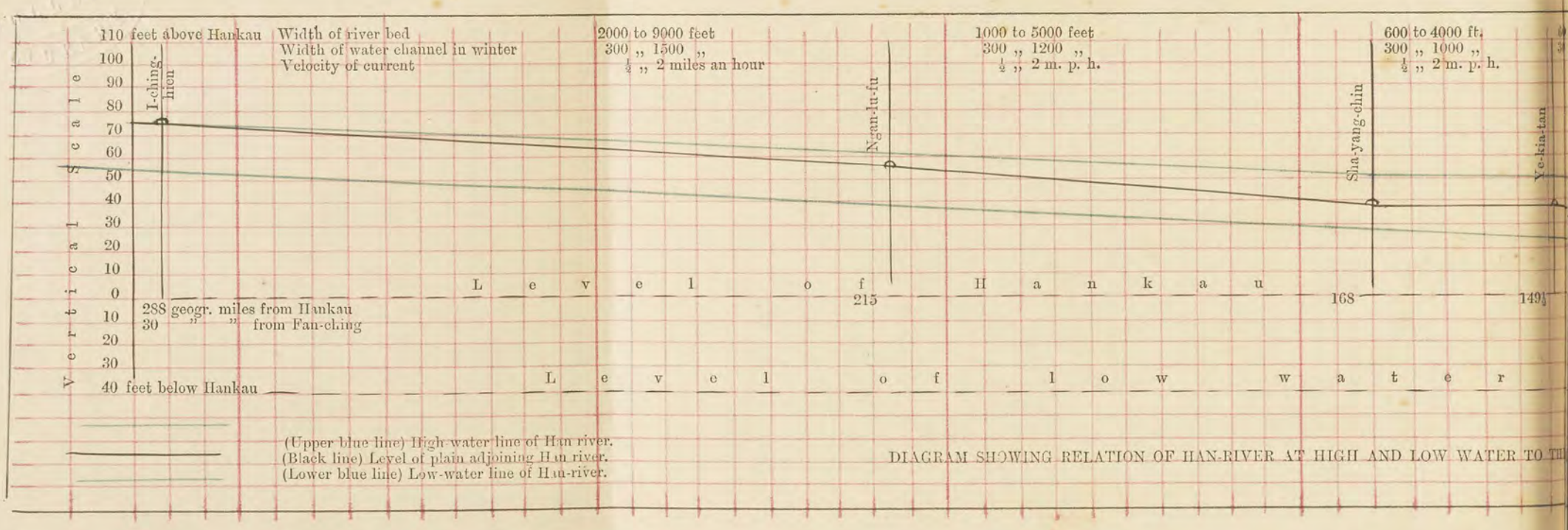

DIAGRAM SHOWING RELATION OF HAN-RIVER AT HIGH AND LOW WATER TO TH

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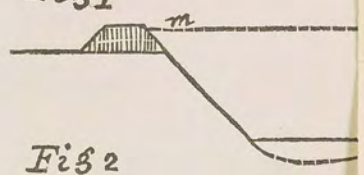

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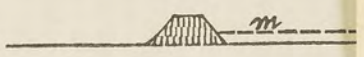

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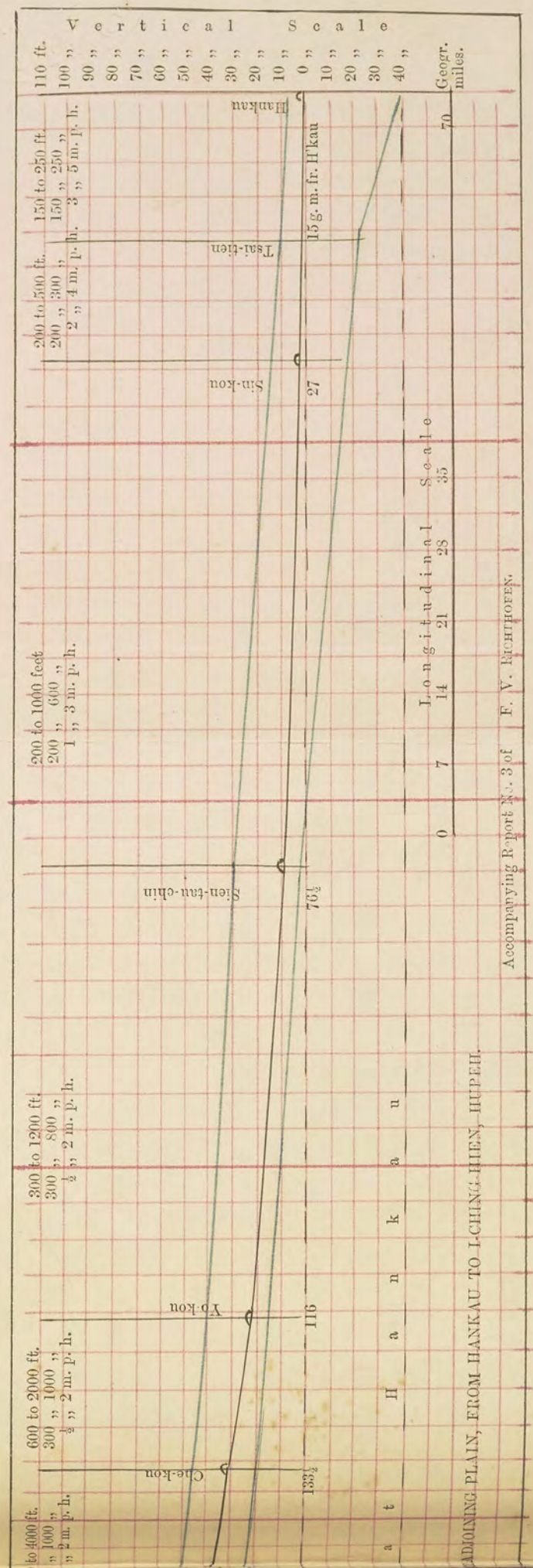

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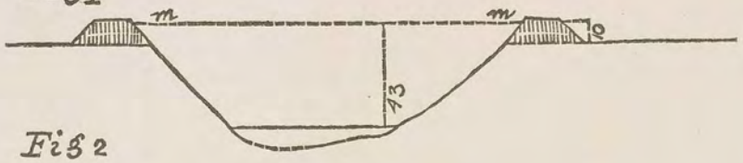

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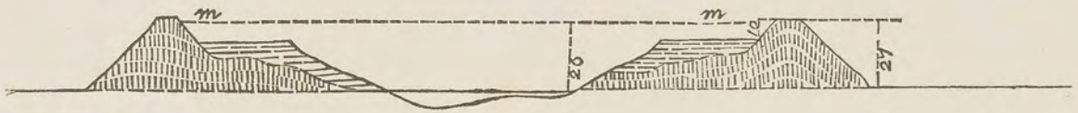


Fig 3

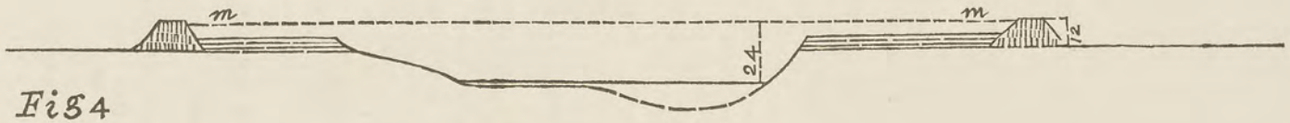
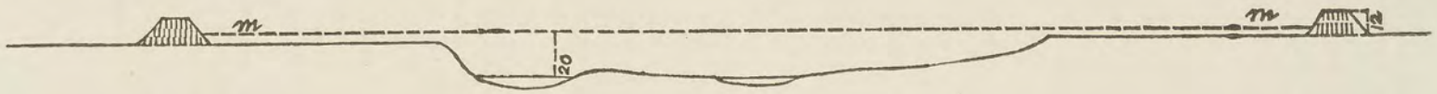


Fig 4



 indicates made ground.

m m indicates the line of highest level of water, in summer.

The vertical scale in these figures exceeds the horizontal from three to five times.

entrance at Hankau and can probably be removed. In summer, navigation would be perfectly safe to Yo-kou, and probably as far up as Ma-liang, 187 miles from Hankau. It is from here, chiefly, that the dangers which I mentioned commence.

That the navigation of the Han is considered difficult, is evident from the fact, that freight per picul from Hankow to Fanching is from 240 to 250 cash, while the same carriers will convey goods for 180 cash per picul from Hankau to the South of Hunan, the Siang being safer for native craft than the Han.

The fifth column relates to the rapidity of the current. The same figures would not be correct for the summer months, when an upper current sets sometimes from the Yangtse into the Han, at Hankau. In seasons of great floods, still water extends for some distance up the Han, while in that portion of the river above Shayang there is said to be a moderate but equal current, swifter on an average than it is in winter. Above Lao-ho-kou, however, there are said to be rocky rapids more difficult to pass in summer than in winter.

A comparison between the sixth and seventh columns of the table will explain the fearful misery to which a good portion of the plains adjoining the Han is exposed in seasons of high water. This plain of southern Hupe, including a portion of Hunan with the Tungting lake, covers an area of about 20,000 statute square miles, and is quite isolated from the rest of the Chinese plains. The relations indicated by the figures of the last column are so unusual with rivers flowing in plains, that a hasty look at them might make it appear as if this plain formed a basin having its deepest depression in the region of Sien-tau-chin, which is moreover situated between a meridional chain of lakes about a hundred miles long, and one may be surprised not to see the plain covered here by one large and permanent lake. As this question is of interest with regard to the frequently recuring floods, I adjoin a diagram which shows that the figures given above accord completely with a gradual descent of the plain.*

The overflow of the Han would be terrible if the inhabitants had not adopted, in the most exposed regions, a system of embanking which it needed probably a very long time to bring to its present perfection, but which is now well adapted to resist the pressure of water and powerful currents of the Han. It can be best understood from a section of the river at Sien-tau-chin, which I insert on next page. The elevation of the plain above low water is here no more than one foot, and the river rises in summer about 26 feet above its lowest level. There is a high embankment thrown up on either side. Between the two there is another plain, about eighteen feet above low water, and in this the river is cut. The belt of elevated ground is from fifty to a few hundred feet wide, on either side. The river overflows it every summer, and deposits on it new layers of sand and soil, thus strengthening the embankments from year to year. The mode in which these strong bulkheads were first formed is indicated by the custom of the people to add continually to the height and outer walls of the embankments, using chiefly some of the material recently deposited between them. It appears therefore, that the foundations of those elevated belts consist of the remnant of ancient earthworks, which were lower than the present ones, and answered all requirements, ages ago, when the bed of the river was cut deeper than it is now in the alluvial soil of the plain.

I have adjoined to the section of the Han and its embankments at Sien-tau-chin a few others, taken at various places:

Fig. 1—Is a section taken a few miles above Hankau, where the banks are high and the surrounding country elevated 35 feet above low water level. The dams are only in some places so close to the riverside as here represented.

Fig. 2—Is the section of Sien-tau-chin, just described.

Fig. 3—Shows the embankments near Ye-kia-tan. The plain is elevated about 14 feet above low water, and the rise of the river is about 24 feet. The dams are built some distance off the natural banks of the river. These are raised by yearly deposition of sediment, in a similar way as near Sien-tau-chin, but the stratified layers rest here immediately on the soil of the plain.

Fig. 4—Is a section across the Han near Ngan-lu-fu. Here, too, the embankments are thrown up at a good distance, as much as half a mile in some places, from the river. The broad current appears to be here exceedingly destructive. I did not notice any difference of level on the two sides of the dams.

Last year's floods have destroyed the embankments of the Han in a great many places, chiefly where they were built close to the riverside. They have withstood them best in that region where the plain is lowest in relation to the level of the river. This fact will no longer appear strange, if it is considered that here, chiefly, the embankments are protected by the bulkheads shown in Fig. 2 and 3, which are made and strengthened by the river itself.

I have heard it pronounced on various occasions, that the frequent floods would render impossible the building of a railroad to Hankau, and through the plain of Hupè generally. Considering merely this technical question, I believe that, by strengthening the present embankments, a railroad could be constructed in the direction of the Han river, without any unusually large expense, while at the same time no greater benefit could be conferred upon these plains, than to lessen the dangers from floods, by the same means which would vastly enhance the well-being of the population in so many other respects. The great work of restoring the embankments is done at present by the order of government, and people are forced to work for the pittance of 50 cash per day. They would hail a more liberal employer. I do not believe that a line up the Han is at all contemplated by those who indulge in schemes for covering China

* When writing these last lines, I intended to insert here a sketch of a diagram, but I have since then made a copy of one I have drawn on scale, and will enclose it in this letter. The figures of the table are repeated in it.

with a net-work of railroads. But whatever connection of Hankau with the north or east be contemplated, a railroad would have to be built up or down some river or other, and it is likely that most of those which would be available are, within the plains of Hupè, accompanied by embankments similar to those of the Han.

I have not met anywhere in China with people more inoffensive and good-natured than those inhabiting the banks of the Han. I have not experienced the slightest attempt at an insult, nor even an unpleasant word, from them; they never crowded to satisfy their curiosity, and met me with civility everywhere, forming in every way a remarkable contrast to the people of Hunan, not excepting, however, that they are less cleanly in dress and habits.

A year ago, when travelling in Shan-tung, I was frequently warned in good earnest by the Chinese, not to go to Peking, as all foreigners there had been killed. The news appears to have spread at the time over a large portion of Northern China as it was current in Shansi. It was evidently nothing but the expression of a feeling of the supposed superiority of the Chinese Government over Foreigners. Strangely contrasting with it, I found now the notion current among the people on the Han, that the "affairs of the Emperor" are in a very bad condition, and that he had to flee to Szechuen to seek protection by his troops. They ascribe to this supposed ill-fate of their Sovereign the drought which has prevailed in the first quarter of this year and has greatly increased the sufferings initiated by the floods of last year. They submit to them quietly, being convinced of so plausible a cause. I could not ascertain whether this feeling is due to the remarkable success which the French charge' d' affaires has had lately in some of these middle provinces. But it is very probably the cause. If so, the fact would be a striking illustration of the deep effect which quiet demonstration of power has on the Chinese mind, quite apart from that effect which pressure may exert on the authorities.

I will write at this place only a few words regarding the products of the Han-valley. They appear to be mostly, if not exclusively, agricultural. Coal is imported from as far off as Lui-yang in Hang-chau-fu, Hunan, and none at all is brought down the Han. There appears to be a great scarcity of wood, as large quantities of it are imported as high up as Shayang from the Miautse country in western Hunan, on the borders of Kwei-chau. The most noteworthy product of the valley, chiefly of the plain on the lower Han, appears to be cotton. Besides it, wheat, rapeseed, tobacco, and various kinds of beans are the staples of the agricultural produce. I am told that no rice is grown in the valley of the Han itself. Some is said to be cultivated on terraced ground between the hills on both sides of the valley, but nearly all that is needed for consumption on the river is imported from the neighbourhood of Tung-ting lake. No sugar is grown, nor did I see any mulberry trees; bamboo is represented only by sparse groves of a small species. The export of vegetable tallow from this portion of Hupè is large, but I did not see any tallow trees in the plain.

As I have mentioned the gold washings on the Han river, I will add a word about them, though they are hardly deserving of notice from an economical point of view. Gold is washed from banks of coarse gravel, a little distance above I-ching-hien. The gravel is shaken with water in a basket, through the meshes of which the dirt escapes upon an inclined rifled board of a few feet in length. At intervals the concentrated dirt is collected from the grooves into a pan and washed by hand. In the handling of the pan the Chinese of this country have acquired a skill that would excite the envy of a practised Californian gold-digger. The gold is fine and in flakes. It appears that the diggers earn from 50 to 150 cash a day per head. The same gravelly beds are worked every winter, as soon as they are laid bare. The gold is, however, found only in the surface layer, which is scraped off about six inches deep. From the quantity of gravel washed in a certain time, and the yield of one day's work, which I saw being concentrated in a pan, I calculated that seven men are able to wash twenty tons of gravel a day, and that the average yield in gold is about 3½ to 4 cents per ton. A singular illustration is here afforded of the fable of the goose laying golden eggs. Every year, the gold is exhausted by man, and its supply renewed by the river; and, if it was at all possible to introduce here contrivances for working a large quantity of gravel in a short time (which is not the case), cupidity would at once destroy the conditions for the yearly yield of gold. The water flows with great velocity in this portion of the river. The gravel banks act on the same principle as the rifles of the Chinese, concentrating on their uneven surfaces the gold from its immensely fine and scanty distribution in the river-sand, of which probably millions of tons are yearly carried over these places in the season of high water. When this subsides, the Chinese comes to reap his regular and unfailing crop.

The old establishment of the custom is proved by the method and skill of the diggers, and by the name of the neighbouring place, Li-kin-tien, which means "gold-diggers inn." Its inhabitants subdivide the ground every year, and stake off their partitions. They pay no royalty or taxes on gold, and appear just to earn a living during those months of the year when they find no employment in field-work.

FANCHING, *April 3rd*, 1870

I arrived at this place yesterday. I expected to find a large trading-place, and was surprised to see only a small town with a water-front of only half a mile, and every evidence of being not the seat of large commerce. The amount of shipping on the Han is very large, and in navigating it, one gets fully impressed with the importance of this throughfare. But the number of vessels lying at anchor here is small; it is frequently surpassed by the number of those which one meets on the river in the course of a few hours. Besides some mandarin-boats, there are here about a hundred cargo-boats carrying 200 piculs and upwards, and small craft are no better represented in proportion. This scarcity of shipping is owing in part to the circumstance that there are a great number of ships at Tang-ho-kow or Lung-kin a small village three miles below Fan-ching,

situated on the mouth of the Tang-ho. A small affluent of this, the Pei-ho, is ascended by small boats, both in summer and winter, to the mart of Shay-ke-chin, distant from Fan-ching, about 500 *li* by water and 380 *li* by land. I estimated the number of small boats lying at Lung-kin at 1,500, and there were many of moderate size, and several of the largest ships that navigate the Han. Lung-kin may in fact be called the port of Fan-ching, and its shipping should, properly, be added when that of Fan-ching is considered.

The cause of the subordinate importance of Fan-ching as a commercial place is at once understood when its position is considered. It owes its existence to the fact, that here the Han (following it up-stream) turns from a south and north into an east and west direction, and that, just at the turning point, it is joined by a navigable north and south river (Pei-ho), which is connected by an easy passage with the valley of the Yellow River. The trade-route up the Han forks therefore at Fan-ching, one branch following the Han to Lao-ho-kou (180 *li*) and Hang-chung-fu (2,300 *li*), the other leading by Shay-ke-chin to north-eastern Honan, and further on to Shansi and Chili. By those vessels taking the first route, Fan-ching is passed unnoticed, while the goods destined for the second are merely transhipped. Unlike Siang-tan, where the merchants actually buy medicines and foreign goods, and a great many other imports, and redistribute them in various directions, Fan-ching is mainly a place of passage, by far the greater portion of the goods arriving with through tickets for the northern marts, and stopping merely to be put on carts or small boats. Passing through Siang-tan, the goods change their owners, passing by Fan-ching they change only their mode of conveyance.

Lao-ho-kou occupies a slightly more favourable position than Fan-ching. There, too, the trade-route forks. One branch again follows the Han-river, and another establishes the connection with Shansi. Goods for the latter province are conveyed on small boats up the Tan-ho-river to the mart of Tin-tse-kwan, whence a passage by land of five days, over a mountainous road, brings them to Si-ngan-fu.* The time occupied from Fan-ching toTin-tse-kwan is usually twenty days. But, besides this similarity with Fan-ching, Lao-ho-kow has the additional advantage of being situated at the head of comparatively easy navigation on the Han. Small boats only are used in ascending the river beyond that mart.

The shipping at Lao-ho-kou, as may be expected from these reasons, is said to be larger than that of Fan-ching, and the trade more considerable.

Fan-ching is a well-built place, and the streets are lined with shops. It has evidently a great deal of small trade. But there are no warehouses, nor does one see much carrying of goods, and the streets have no busy appearance, the water-front even is quiet. The shops are supplied more with the necessaries of life than with articles of luxury. Foreign piece-goods occupy a conspicuous place, the largest shops being well supplied with them. I noticed that Russian broad-cloth is much in use.

A distinguishing feature of Fan-ching is the number and variety of small manufacturies. Silk brocades are made in great quantity. The thick thread used for them is made from silk raised in the vicinity, but the amount of this produce is said to be small; it is sold at Tls. 3 per catty. Another manufacture employing many hands is that of ribbons, both of silk and cotton. The silk thread used for them, which is thin and strong, is imported from Su-chau. There are workers in tin, carvers in ivory and bone, makers of artificial flowers, and other small artisans whose numerous workshops give the city the appearance of quiet industry. The people were exceedingly well behaved, and I walked repeatedly through the streets, quite unmolested; this was due, in part, to the measures which had been taken by the authorities during the presence of the French chargé d'affaires, a few weeks ago; but apart from this circumstance, I can fully apply to the people of Fan-ching my previous remarks on those of the banks of the Han in general.

It is a remarkable circumstance, that the valley of the Han, situated as it is between several coal-producing regions, appears to be totally deficient in coal-mines. Hunan coal is carried in quantity to Fan-ching and Lao-ho-kou. It is sold at the former place for five cash per cattie.

The distance of Peking from Fan-ching is 24 stations reckoned at about 100 *li* each. Freight on this route is from $3\frac{1}{2}$ to $4\frac{1}{2}$ cash per catty per 100 *li*. More goods are sent by water to Shay-ke-chin, whereby a trifling saving is occasioned.

It uppears that only two waggon-roads lead to the north: one, the Peking road, by way of Kai-fung-fu. or Pien-yang-chin, by which name alone that city is known here; the other, the Shansi-road by way of Ho-nan-fu. They divide at Nan-yang-fu. I will start to-morrow by cart on the road to Ho-nan-fu, Shansi, and Peking. Hoping that, on my arrival at that place, I shall be able to write on more interesting matters than you will find related in this present letter, I remain &c.

FEO. F. v. RICHTHOFEN.

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* Freight from Fan-ching to Si-ngan-fu is Tls. 1. 2, 0 per picul.

No. III.

Amherst College

REPORT

BY

from BARON VON RICHTHOFEN,

ON THE

PROVINCES OF

HONAN AND SHANSI.

SHANGHAI:
PRINTED AT THE "NORTH-CHINA HERALD" OFFICE.
1870.

No. III.

REPORT BY BARON VON RICHTHOFEN.

ON THE

PROVINCES OF HONAN AND SHANSE.

A. MICHIE, Esq.,

Chairman of Committee of Shanghai General Chamber of Commerce.

DEAR SIR,

I have completed my journey overland from Canton to Peking, and hasten to write you some particulars relating to the latter part of it.

I left Hankow on March 12th, and ascended the Han river to the mart of Fanching, opposite the city of Siangyang-fu. As I addressed you an account of my observations on the Han river from that place, I now commence my notes with the departure from Fanching.

The road to the north forks at Nanyang-fu. The main branch, which has been repeatedly gone over by foreigners (f. i. Mr. Wylie in 1866, Mr. Oxenham in 1868, Comte Rochechouart in 1870), continues through nearly level country to Pien-liang-ching or Kai-fung-fu, and thence to Peking; while another branch leads directly north, through a mountainous region, to Ho-nan-fu. I took the latter route. I then examined several coal districts situated in the province of Honan, north and south of the Yellow River. From Hwai-king-fu I continued my journey through Shansi. The main line of it is marked by the places: Tse-chau-fu, Ping-yang-fu, Tai-yuen-fu, Ping-ting-chau, Ching-ting-fu, Peking.

I will now attempt to give you a sketch of the main features of the regions through which I passed, confining my account to such subjects as may be of immediate and practical interest. As I went through districts which differ much from each other in character, I will describe them in the order in which I passed through them.

PROVINCE OF HONAN.

From Fan-ching 樊城, the waggon road follows the course of the Pe-ho. The frontier of Hupè and Honan is reached after 85 li of travel. My route then led by Sin-ye-hien, Nan-yang-fu, Nan-chau, Lu-shan-hien Ju-chau, Honan-fu, Kung-hien, Tz'shui-hien, to Hwai-king-fu, which is a total distance of 1,200 li, on roads which, with the exception of that portion between Fan-ching and Nan-yang-fu, had not before been seen by foreigners. Even the early Jesuits appear not to have been acquainted with the important passage of Nanchau. I believe that nowhere on earth does there exist a more good-natured race than inhabits the province of Honan. It is true, that in few portions of China was I so much molested, by the curiosity of the people, as in the cities and, chiefly, the trading marts of Honan. The news of our journey preceded us constantly, and we * found frequently tens of thousands of people waiting to see us, and the roads lined for miles by the villagers of the vicinity; but, importunate as this crowding is, it is impossible to be much provoked, when one sees the anxiety of the people carefully to avoid anything that might give offence. I heard the epithet of "Yang-kwei-tsze" only in one or two places, situated on the Yellow River. The density of the population is enormous, chiefly in the low lands adjoining the Yellow River, on the north.

1. *Valley of the Pe-ho.*—

Two twin rivers, the Tang-ho (唐河) and the Pe-ho (白河) drain an area of about 8,000 (statute) square miles, of that portion of Honan which belongs to the basin of the Han. Both are navigable for small boats, all the year round. They unite a short distance before emptying into the Han, the Tang river giving the name to their joint waters, and to the shipping place (Tang-ho-kou 唐河口) which is situated at its mouth, about three miles below Fan-ching. The Tang-ho† is the more important of the two, as on one of its affluents, the Tsan-ho, is situated the famous mart

* That is, myself and my interpreter, Paul Splingaert, a Belgian, who has been my companion on my travels through China for eighteen months. I cannot praise too highly the services he has rendered me, by his admirable ability in Chinese conversation, by his courageous conduct and good tact, as well as by his honesty and fidelity. I owe it to him, that we are on friendly terms with the natives wherever we have an opportunity to have intercourse with them.

† The river has its name from the city of Tang-hien, situated on its banks, and must not be confounded with the Tan-ho (丹河,) another important affluent of the Han, by which goods are shipped from Lao-ho-kou to Shensi.

of Shi-ki-chin (賒旗鎮,) which is the entrepot for the transport of all merchandize, between the northeastern provinces on the one hand, and the central and southwestern on the other. Its importance is evident, if it is considered, that there is from here a continuous water-communication, south, west, and south-east, to remote regions of the Empire, while to the north and northwest there is no longer any water-communication at all, and in a northeasterly direction it commences only at a considerable distance; also, that there is no other road besides that passing through Shi-ki-chin, by which goods can with convenience be transported from Hupè, Szechuen, Hunan, etc. to Honan, Shansi, and some portions of Chili. These circumstances place Shi-ki-chin considerably ahead of Fanching, as regards their relative commercial importance. I have tried to show, in my letter from Fan-ching, that the value of that place is overrated. The reason why it is better known than Shi-ki-chin, to the merchants of Hankow is, that the vessels which leave Hankow, with goods destined for the northeastern provinces, are only bound to Fanching, where all merchandize is put on small boats, adapted for the shallows of the Tang-ho. This river is so short that the rains, in summer, can exert only a temporary and transitory influence on the state of the water, and is therefore navigated by small boats all the year round.

The Pe-ho is navigable to Nan-yang-fu, at all seasons. The navigation is difficult and slow, on account of the numerous bends, and not of any importance excepting for the adjoining districts.

The great Peking road follows the Pe-ho to Nan-yang-fu, and is joined near Yu-chau by a branch from Shi-ki-chin. For this reason, there is scarcely any traffic on it between Fanching and Yu-chau, while from that place onwards the road is said to be a much travelled highway.

The Honanfu road is equally destitute of traffic, between Nan-yang-fu and Nan-chau. Here it is joined by a road from Shi-ki-chin, and this junction is immediately attended by the signs of a considerable intercommunication.

The valley of the two rivers is an extensive and densely populated plain, of moderate fertility, surrounded by barren hills. It appears that in the north-east there is a wide gap (not marked on maps), between the northern and eastern hills, as the Peking road is said to pass through open country all the way to Kai-fung-fu, and hills being visible only in the distance. The products of the country are agricultural, and, though very large in quantity, appear to be mostly consumed by the great number of inhabitants. With the exception of cotton, of which a considerable quantity is exported westward, hemp, a trifling amount of silk, and an inferior kind of opium, which is only raised for local consumption, none of the productions appear to deserve much notice.

Before leaving this region, I must mention the occurrence of coal in it. As I did not know before of the existence of any coalfield at all, in the whole basin of the Han river, and as the total absence of this fuel appeared to be corroborated by the fact, that Hunan coal is largely shipped to Fanching, and up the Pe-ho to Nan-yang-fu (where it is sold at 5 to 5½ *cash* per cattie), I was much interested to learn, that coal is mined in the Kiu-li-shan, a mountain range one hundred li north of Nan-yang-fu, and the first on the borders of the valley, I visited the place. The coal-bearing strata occur here quite isolated and in a very remarkable position. They carry two small seams of inferior anthracite, which is dug in quite a number of small mines, and sold at 1 *cash* per cattie. At Nan-yang-fu it could be delivered at 5 *cash;* but it cannot compete at that price with the coal from Hunan, which has travelled more than twenty-five times the distance. The locality will not deserve any further attention; but it retains its interest as the only known instance of the occurrence of coal in the basin of the Han river.

2. *The Fu-niu-shan.* (伏牛山)—

Between the plain of Nan-yang-fu and the valley of Lu-shan-hien, on the Sha-ho, I passed through a series of parallel mountain ranges, trending W. by N. to E. by S., and chiefly consisting of metamorphic formations and granite. The main range is known all over the country by the name of Fu-niu-shan, and retains it for the length of 800 li. As this is one of the few instances where the Chinese have given a definite, and generally-accepted, name to a long range of mountains, it should be retained, in the place of "Pe-ling," and other vague denominations, by which the same range is designated on our maps.

This mountain range is of interest and importance, being, as it appears, the eastern termination of the great (Chinese) Kwen-lun range of Central Asia, which gives origin to the Yellow River. Being nearly impassable, it forms, throughout its extent, an efficient barrier to inter-communication, first between Kokonoor and Tibet, and then between northern and central China. There are only two passages known to me, west of that at Nan-chau. One is between Lao-ho-kou on the Han and Si-ngan-fu in Shensi. It is said to lead through narrow gorges and over a high pass. The other connects Si-ngan-fu with Han-chung-fu, on the head waters of the Han. It is a famous mountain road, reputed for its wild scenery and the high mountains which it crosses. It forms part of the highway from Peking to Ching-tu fu and Tibet. These two roads are only passable for pack-animals. The first and only convenient trade road, through the same mountain range, is that by way of Nanchau, which I took. The altitude of the pass above the sea is between 1,000 and 1,500 feet, though the mountains rise to 4,000 and 5,000 feet on either side, and attain greater altitudes a little distance west. The watershed is approached from the south by an affluent of the Pe-ho, and the northern descent follows a small feeder of the Sha-ho. If an engineer were to construct an imaginary cut, through a high mountain range, for laying a convenient railroad track, he could scarcely solve his task more perfectly than nature has done in this gigantic cut—thousands of feet deep, and one hundred li in length, which crosses all the parallel ranges composing the Fu-niu-shan. The grade is so gentle, and the width of the passage so favourable, that a railroad could be built through it without the slightest difficulty.

A little further east, the great range of the Fu-niu-shan terminates. It constitutes probably one of the most important features in the geography and geology of China.

From an economical point of view, little positive importance attaches directly to this range (the Fu-niu-shan). With the exception of the populous city of Nan-chau, the country is thinly inhabited. It excels, however, in the culture of wild silk, which is brought for sale to Lu-shan-hien. Many hill-sides, consisting of granite, marble, sandstone, and other kinds of rock that do not excel by the fertility of the soil resulting from their decomposition, are covered with stumps of oaks, planted in rows. These belong to two species, the leaves of both of which constitute the food of the wild silkworm. There are two crops of worms raised, one in June, and the other in August. Late frosts damage the leaves of the oak trees; dry heat is injurious to the worms, while rains are favourable to their growth. In the last two years the worms were small and sickly; and as the crops on the fields, too, had failed, I found the people living in the hills off the road, literally in a starving condition.

3. *Lu-shan-hien and Ju-chau.*

Lu-shan-hien is situated in the broad valley of the Sha-ho, Ju-chau in that of the Ju-ho. Lu-shan-hien (魯山縣) is widely known by its large trade in wild silk, which is all raised in the Fu-niu-shan. I am sorry that I cannot give particulars in regard to this trade; the almost unexampled crowding of people rendered it utterly impossible to make enquiries. I have seen only very coarse but very durable fabrics. The raw silk is torn off from the cocoons, and threads are spun from it in the rudest manner. This thread is sold at a little less than a tael per cattie. It is probable that the cultivation of the silk oak is capable of great extension among these barren hills, of which no other use is made; and that the manipulations can be much improved, if the inhabitants are encouraged to use more care, in a similar way as the crops of tea in Hunan and Hupè have increased in quantity and improved in quality, in consequence of the increased foreign demand. There is also some silk of the mulberry silkworm, made in the valley of the Sha-ho.

Lushan is a very populous city, and the seat of various manufactures, such as paper, pottery, and iron-castings. The pig-iron is imported from Tsechaufu in Shansi. Formerly it was procured from the vicinity, as I will show in another paragraph; and the amount of old iron, on hand from that time, may in part account for the general use to which iron is put throughout this region. I was particularly struck by the extensive use of carts with four wheels of cast-iron, and of superior construction. They are employed in the transportation of freight for short and long distances. Potteries are plentiful in the vicinity.

Some of these industrial pursuits are due to the vicinity of the coalfield of Lu-shan and Juchau, which extends, as a plateau of a few hundred feet elevation, between the valleys of the two rivers. The width, where I crossed it, is 70 li. This coal region is otherwise comparatively unproductive.

Juchau (汝州) is situated in a valley which is about six miles broad, and abounds in agricultural products. While the Sha-ho winds its course slowly over a flat of sand and pebbles about a mile in width, the Ju-ho, owing to the greater altitude of its valley, is a rapid stream, and has well defined channels. All beyond their banks is rich bottomland, capable of constant irrigation from wells. The scenery is beautiful, owing to the picturesque background of the Fu-niu-shan to the southwest, and a cluster of high mountain ranges which intervenes between Juchau and the Yellow river; among them is the Sung-shan, one of the five sacred mountains of China, and probably about 7,000 feet high. The most prominent feature in the landscape is the isolated Wei-ton-shan, standing high aloft in front of the Fu-niu-shan. Large lead mines are said to be worked in it. Silver is extracted from the lead. This metal (at 140 *cash* per cattie), together with white lead, is exported to Shansi and Shensi.

Cotton is the staple of the agricultural products. It is exported by Shi-ki-chin (360 li) to Fanching and Lao-ho-kou. The price at Juchau is 380 *cash* per cattie of 22 ounces, at Fanching from 280 to 300 *cash* per cattie of 16 ounces. Eighty out of every hundred *mow* were said to be planted with cotton, at the time of the second crop. Wheat, barley, peas, beans, rapeseed, sweet potatoes and poppy constitute the first crop; cotton, Indian corn, millet, kauliang, beans, and hemp, the second.

4. *Ho-nan-fu.—*

The road from Juchau to Ho-nan-fu leads around the west end of the triangular-shaped group of the high Sungshan ranges, through a slightly elevated but open country of moderate fertility. A few miles south of the city it passes through the natural gate of the Lung-men, whose steep limestone walls are adorned with monuments of the Wei and Tang dynasties, when Lo-yang, near Ho-nan-fu, was the capital of the Empire. The finest piece of workmanship is a temple of the Wei, excavated in the solid rock, and dedicated to the mother of Buddha. Its walls are covered with inscriptions and bas-reliefs. I had brushings taken of some of the former, with the intention of presenting them to the Asiatic Society. But Dr. Wells Williams, who had the kindness to decipher them for me, informs me that they are of no value, being only votive tablets from the time of the Wei dynasty, put under effigies of Buddha, and dating from the year 497 to 520 of our era. The bas-reliefs are remarkable on account of their graceful design.

Ho-nan-fu is situated in the fertile valley of the Lo-ho, which extends eastward to Kung-hien. It is parallel to the Yellow River, and separated from it by a ridge about 500 feet high. The city offers nothing remarkable. But in the vicinity, chiefly in the northern hills and among the temples

of the Sung-shan (嵩山)* the antiquarian may find interesting relics of those dynasties which had their residence near Ho-nan-fu.

Three roads from the east and south unite at Honan-fu, and only one leads west. This fact gives some importance to that city as a place of transit, because there is no waggon-road leading west from Kiangnan, Shantung and eastern Honan, but that must pass through Honan-fu by one of the three lines mentioned, in order to reach the northwestern provinces. As they are important trade roads, a few more words in regard to them may be of interest.

1st. The southern road forks at Ju-chau, both branches leading to important centres of commerce. The first, to Shi-ki-chin, connects the trade to and from Fanching, Hankow, and the Han river generally. The second goes to Chow-kia-kou (周家口) a very considerable mart situated in Honan, near the city of Chin-chau-fu, at the place of confluence of three rivers, which unite to form the Sha-ho. This river, in its turn, joins the Hwai-ho (淮河) a well-known feeder of that portion of the grand canal, north of Yang-chau-fu. Chow-kia-kou is considered as the head of navigation, though rivers may be ascended by small boats a short distance farther up, at high water. I learned that the navigation from Chingkiang to Chow-kia-kou is by no means easy. There is a place in the department of Fung-yang-fu, where the Hwai river is full of rocks. Boats cannot pass it, and all goods must be carried eight li by land. Then they continue their journey through to Chow-kia-kou by water, but the navigation of the Sha-ho is said to be difficult. I did not learn particulars in regard to the charges for freight, and the squeezes between Chingkiang and Chow-kia-kou.

2nd. The second road leaves Honan-fu by the east gate, and continues parallel to the Yellow river, and south of it, to Pien-liang-ching or Kia-fung-fu. I followed it to Sz'shui-hien, a distance of 195 li. Between Kung-hien and Sz'shui-hien it crosses a ridge over 1,000 feet high, a very inconvenient passage. It is little in use, excepting by travellers. What little traffic there is from the marts of Lung-men-kou and Pien-liang (both situated on the Hwang-ho) to Honan-fu ascends the river to Mang-tsin-hien, 40 li from Honan-fu.

3rd. The third road crosses the Hwang-ho at Mang-tsin-hien, and goes thence in a north-easterly direction to Hwaikingfu, Siu-wu-hein and Wei-hwui-fu, where it joins the great road from Fanching to Peking. The chief commercial place with which it establishes a connection is Tau-kou-chin (道口鎮) situated on the Wei-ho, 70 li below Wei-hwui-fu. It is 1,200 li distant from Tientsin, and is said to be reached from that place by easy navigation.

4th. The western road follows the southern bank of the Yellow River for 700 li, to its great bend at the fortified pass know as the Tung-kwan, which plays an important part in Chinese history. Here it unites with another great waggon-road coming from Peking, through the province of Shanse. The united trunk road goes then on to Si-ngan-fu and Lan-chau-fu, and is passable for carts at least as far as Su-chau-fu, far in northwestern Kansu, and 3,500 li distant from Honan-fu. There are several branches from this trunk-road in Shensi.

By this system of roads, Honan-fu and the northwestern provinces are connected with three places of commerce, each of which marks the head of permanent navigation of the respective rivers on which they are situated, namely, Shi-ki-chin, which establishes the connection with Hankow, Chowkiakou, the depôt of the goods coming from Chinkiang, and Tankow, which occupies a similar position in respect to Tientsin. The two other places, Lungmenkou and Pienliang, are of subordinate importance. The distance of Honan-fu from Shi-ki-chin is 540 li, from Chow-kia-kou 700 li, and from Tankow 500 li. They are all connected with Honan-fu by what the Chinese call good waggon roads. Although freight from Shanghai to Chowkiakou is probably cheaper than to the two other places, that mart contributes scarcely at all to the supply of Honan-fu, owing to the greater distance by land, and, perhaps, to extravagant squeezes on the water route; while between Shï-ki-chin and Tankou the imports appear to be fairly divided. One can, indeed, indicate with safety the mart from which each separate place in Honan receives its chief imports, if one takes account of its relative distance from each of the three sources, or rather intermediate places, of supply. Thus, Ju-chau draws its imports almost exclusively from Shi-ki-chin, Hwai-king-fu from Tan-kow, while the southeastern portion of the province is supplied from Chow-kia-kou. It is difficult to tell which, of the three places, takes the largest share of the commerce of the province of Honan. But Shi-ki-chin and Tan-kow have an advantage in supplying Honan-fu, through which a considerable amount of goods pass that are destined for Shensi and Kansu.

The conditions as here described, will probably be modified in the course of the next few years. Tankow is more favourably situated than Shi-ki-chin, because, during the greater part of the year, goods can be carried by boat to Siu-wu-hien, 170 li higher up the Wei river, and 330 li from Honan-fu. It is probably owing to the old-established trade connection with Hankow, which formerly supplied all southern produce and foreign goods, that Tankow has not yet gained the ascendency over Shi-ki-chin, in furnishing the region of Honan fu with foreign imports; it needs only time to effect this change. On the other hand, Hankow will not lose, because it will eventually monopolize the importation of most articles into Shensi and Kansu, by the mart of Lao-ho-kou

* I would strongly advise any traveller who may hereafter visit the region of Ho-nan-fu, not to neglect making a trip from Ju-chau to Tang-fung-hien. This city is situated between the mountains, and immediately at the foot of the sacred Sung-shan and the still grander Yü-tsai-shan, both of which are said to be full of ancient temples. The scenery must be very grand, and the geology of exceeding interest. I did not visit the place, because I had had no opportunity, previous to my visit, of forming a correct idea of the country. It happens frequently, on a first tour of reconnaissance, that one knows too late what would have been the best route of travel, and must be satisfied with giving a hint to succeeding travellers.

(老河口) on the Han. and thereby divert a portion of the Tientsin trade, which is already rapidly diminishing in value. By that route (Lao-ho-kou) there are five days of land travel to Si-ngan-fu, while by way of Shi-ki-chin and Honan-fu, or of Tankow and Ho-nan-fu, there are fifteen. It is the length of transportation by land which comes almost solely in consideration, in China; where the supply depends upon the cost of freight, a few hundred li more or less by water do not materially affect it.

The cost of transportation by land of goods, whether it be done by carts, on animals, on wheelbarrows, or by men, is nearly the same throughout the whole country, from Fanching to Peking, and may be safely put at $3\frac{1}{3}$ to $3\frac{2}{3}$ *cash* per li per picul, (equal to about 16 cents per English mile per ton). In some exceptional cases (for instance where camels are employed), I found it as low as $2\frac{1}{4}$ *cash*, and in others (as on difficult hill-roads), as high as 4 *cash* per picul; but the first figures may be taken as the true standard, on all great trade-roads. As compared with boat traffic on the Chinese waters, the cost of freight by land is therefore from twenty to forty times as high as the usual standard on those rivers which are easily navigated.

The chief article of trade of the region of Honan-fu is cotton. It appears that the various imports are chiefly paid for by the sale of this staple. I was told that the sales continue all the year round, and average about 10,000 taels daily, in the city. It is chiefly exported to Shen-si and Kansu, a smaller amount to Shan-si, and Hupè. When I travelled through the country, it was just the time of sowing cotton; by far the greater portion of all land, other than alluvial, had been prepared for this culture. The alluvial bottomlands along the Lo-ho, which are yearly inundated, were a magnificent garden of wheat, fruit-trees and poppy.

The cultivation of the poppy is spread throughout all the regions which I traversed. In Honan and Shansi, people date the commencement of the use of opium 25 years back, that of the cultivation of the poppy twelve years. Since that time the progress in both respects has been astonishing, and on the whole route from Fanching to Peking, I found scarcely any but native opium in use. Wealthy people only continue to smoke the foreign or "Kwangtung" opium, and acknowledge that it is superior in flavour to the Chinese. It appears that a great deal of it is adulterated by the Canton merchants, in order to put it within reach of the common people. No wonder therefore, that the inhabitants of small towns and villages are generally of the opinion, that Indian opium is inferior, in quality, to the better descriptions of their own produce.

The general classification of opium, from different countries, in regard to quality, is as follows. 1st, Indian or "Kwangtung;" 2nd, Kansu; 3rd, Shensi; 4th, Honan and Shansi; 5th, Szechuen and Kweichau. There is only one opinion as to the superiority of the Kan-su and Shensi opium, and the inferiority of that from Szechuen and Kweichau, to that produced in all other provinces of China. The gradations in price are in perfect accordance with these distinctions. Szechuen opium is everywhere the cheapest, and therefore extensively consumed by the common people. Its price varies between 400 and 500 *cash* a tael; Hupè, Honan, Shansi, sell at 600 to 700 *cash;* Shensi, at 800; Kansu from 900 to 1000; foreign at 800 to 1600 *cash*. All these prices are for prepared opium. From all I could learn, it may be said that the foreign drug is nearly driven out of the market; or, at least, that it is almost only in use with those classes of people who can afford to pay for the flavour of the unadulterated article. This is probably due, in some measure, to adulteration; but it is quite certain, that even the better descriptions of Indian opium have to compete with a dangerous rival in that raised in the provinces of Kansu and Shensi.

5. *The Yellow River.*—

I crossed the Yellow River near Sz'shui-hien, 200 li east of Honan-fu. The river is here about one and a half mile wide, and divided into several shallow branches, with broad sandbanks between. The southern shore is steep, the northern flat and indistinct. These appear to be the main features of the river, for a considerable distance west and east of the place where I crossed it. The water is extremely muddy, the current from two to three miles an hour. The mere crossing of the river is attended with considerable difficulty. It is said to occupy not unfrequently a whole day, and not to be possible at all when the wind is fresh from the west. These circumstances did not bode well for the news I was to gather, in regard to the capability of the river for navigation. The substance of my information is this, that the Yellow River is navigable between the mart of Lung-men-kou * and the city of Mang-tsin-hien, 40 *li* northeast of Ho-nan-fu, a total distance of 125 miles, in an air line. The boats should draw no more than three feet, and most of them draw only one foot. The navigation is slow and difficult, on account of the frequent shoals and the swiftness of the current, and because the banks of the river are not adapted for tracking. When the water is high, the difficulties are considered to be even greater than they were in April, the time of my visit. Above Mang-tsin-hien, the river is properly not navigable to the great bend (160 miles in an air line), because its bed is rocky and the current very strong. The journey is sometimes successfully performed with very small boats; but it is considered a daring undertaking; and as the boats are almost entirely dependent on the wind, they need a long time to go up stream, and carry no heavy cargo. All goods destined for the upper country are landed at Mang-tsin-hien, and continue their journey viâ Honan-fu, by land alone. I was told that, above the great bend, the Yellow River can again be navigated for a short distance, probably to the neighbourhood of the narrows of the Lung-men. But on the whole, we must arrive at the conclusion, that the Yellow River, though one of the largest rivers, scarcely deserves

* Lung-men-kou is situated 90 li northeast at Kaifungfu (Elias), just at the place where the New Yellow River leaves the old bed, and is said to be a shipping place of little importance. It has already been indicated by Mr. Elias as the lower limit of navigation.

the epithet navigable, even though we do not possess any accurate researches beyond the limit of that portion of the stream which has become so well known by the admirable labours of Mr. Ney Elias.

Perhaps we would not be forced to so absolutely unfavourable a conclusion, if we were in possession of observations on the condition of the river, at high water. It is then, chiefly, the swiftness of the current which renders navigation difficult for native craft. And as this is not an impediment to steamers, there is a slight chance left, that for them the river may be navigable in the summer season, at least in portions of its course. But, on the other hand, it appears, that the rise of the river at the place where I crossed it is only a few feet, owing probably to the rapid descent of the water, the width of the river, and the flatness and ill-defined character of its northern bank. I believe that a rise of five feet, at that place, would allow the river to carry, past any given point, at least from ten to fifteen times the volume of water which flowed down in April.

I attempted, too, to collect some information in regard to the destructions caused by the Yellow River, above the point where its new course branches off from the old bed. It is the region adjoining the right bank, commencing from a place a few miles below the city of Sz'shui-hien, which is chiefly exposed to them. The last destructive flood, before 1868, took place 22 years ago, at Law-yang-hien, just opposite the place where the new river leaves the old bed through a break in its left bank. The flood of 1868 was caused by the rupture of the embankments between Ching-chau and Yung-tsi-hien, about 150 li above Kai-fung-fu. It recurred at the same place in 1869, in a far more destructive way. A region of about 200 li in length and about the same in breadth, comprising the districts of Ching-chau, Chung-mau-hien, Wei-shi hien, Tung-hü-hien, Ki-hien, and a portion of Chin-liu-hien, was then flooded. The water was shallow, and few lives were destroyed. But the lasting damage to the country is said to be enormous, because the inundated region was covered with sand, and the greater portion of it has been rendered unfit for the cultivation of grain. It is therefore evident, that the report of a connection existing between the waters of the Yellow River and those of the Yangtse, by way of the Sha-ho, Hwai-ho and the Grand Canal (if by no other channel) was well founded. But I was told by my informants, that the water on and near the bank of the Hwangho was so shallow as not to admit navigation from it to the southern waters. At present the connection does no longer exist, as the damaged embankments are said to have been completely repaired by the government, at an expense, as the mandarins relate, of two million taels.

The two places mentioned, and another which is 80 li above Kai-fung-fu, have been considered from of old as those which are most exposed to danger. The reason is, that the embankments are made of fine sand, and cannot easily be kept in repair.

6. *Coal regions South of the Yellow River.*

In going northwards from the Han river, the places where coal occurs increase gradually in number. It appears that no coal mines exist in all that country intermediate between the range of the Fu-niu-shan and the Yang-tse, from I-chang to Nan-king; and although it is probable that the members of the coal formation, which make up a portion of that country, are not completely destitute of coal, yet the absence of any known mines leaves but little prospect of finding any coal that would be worth extracting.

The first mines are met with on the southern slope of the Fu-niu-shan. I have mentioned, on another page, that they do not deserve much attention.

The *Coalfield of Lushan and Juchau* follows next. It is the only one known, between those of central Hunan and of Ping-yang fu in Shansi, which produces bituminous coal. I crossed it between the cities of Lu-shan-hien and Ju-chau. It forms here a plateau a few hundred feet high and 70 li broad, and is nicely defined by the valleys of the two rivers Sha-ho and Ju-ho, while beyond these are its geological boundaries, namely, the chain of the Fu-niu-shan to the south, and the high ranges of the Sungshan group to the north. Going east, its area diminishes in width as the two rivers converge, while to the west its boundaries are irregular and less clearly defined. It extends in that direction into the I-yang district, and probably beyond. The substructure of the plateau consists of limestone. The coal measures rest on it. Some portions of the coal district are full of disturbances, in others the stratification is quite regular. Coal is extracted in several places. There are a considerable number of workable coal beds, as can be distinctly seen in some ravines which are cut through and expose them to view. But the Chinese never do work more than one coalbed in one mine. They select, of course, that which is the most favourable as regards situation, thickness, and quality of coal. That which is worked most is from 6 to 8 feet thick. The coal is black, laminated, of uneven fracture, and brittle. It is a caking and coking coal of tolerable purity, though in some places containing much sulphuret of iron. Very little lump coal is produced, nearly all that comes out of the mines being nut and small. All coal which arrives at the surface is immediately delivered to contractors, who select first the large pieces and sell them at 100 *cash* per picul, and burn the rest to coke. This is sold at 240 *cash* per picul. As a few thousand small coke kilns are burning simultaneously at every mining place, and are attended to by a large number of workmen, these places have a busy and lively appearance, and are known from afar by the volumes of black smoke which are emitted. The coke is largely consumed in the vicinity, and carried in various directions, to within a distance of 150 li, by means of ox-carts which run on four cast-iron wheels, as before described.

In this district, the Chinese do not work their mines to advantage. The greatest depth at which they mine is 200 feet. Wherever the coalbeds sink to greater depth, their progress is checked. There would be no difficulty in finding more favourable places, where several coalbeds could be mined through one set of works, and probably much better and more solid coal would be extracted.

Much additional importance is imparted to the coalfield of Lushan, by the profuse occurrence of excellent clay iron ore in the coal-bearing strata. It was smelted during the time of the Ming dynasty, and numerous large piles of slags still bear witness to the great extent to which iron was manufactured. It appears that the troubles attending the accession of the new dynasty, caused the complete cessation of the manufactury of iron in this much exposed region, while it continued to flourish in the recesses of the mountains of Shansi. It did not revive afterwards; and, although the inhabitants know the iron ores well, they pretend to have completely lost the science of extracting the metal. The favourable geographical position of the Lushan district, renders it probable that it will still play an important part in providing a portion of China with iron.

Proceeding north, we enter the *coal region of Ho-nan-fu.* It joins the last immediately to the north, but differs from it, on geological grounds, and because all the coal in it is anthracite. The chief mining places are : 1st, Taupo, situated 100 li northwest of Ju-chau, and at the same distance south-southeast of Ho-nan-fu; 2nd, the Kingping-shan hills 錦屏山 of I-yang-hien 宜陽縣 100 li southwest of Honan-fu; the district must not be confounded with another I-Yang-hien 伊陽 belonging to Juchau, politically as well as in regard to its coalfields; 3rd, the hills south of Kung-hien, 130 li east of Honanfu. The extraction of coal in these various localities is considerable, and allows a very populous country to be well supplied with fuel. The thickness of the coal beds worked varies from 6 to 18 feet. Yet, I do not believe that this coal region equals that of Lushan and Juchau in prospective importance, because the position of the coal is irregular, and such as to suggest at once a plausible cause for the crumbled up condition in which the anthracite arrives at the pit's mouth.

These are all the coal regions of Honan south of the Hwang-ho that have come to my notice.

7. *The Loess of Northern China.*

It may not be out of place, before proceeding north of the Hwangho, to give a few explanatory notes, in regard to a formation which plays an immensely important part in the physical features and the economy of northern China, and which I shall have hereafter to mention on almost every page. Everyone who has walked in the vicinity of Chingkiang, on the Yangtse, will recollect the yellow hills which surround that city, and in which the Chingkiang branch of the grand canal is deeply cut. They consist of loess, which is there about 200 feet thick. The same formation composes a large portion of what is generally called the great plain, and it forms probably a broad belt, intervening between it and the surrounding hills. It appears not to exist in southern China or Szechuen, and is but little developed on the Yangtse above Nanking, and on the Han, but spreads over all the northern province, covering everything where it has not been carried away by water. In Shansi, I found it spread equally over table lands 6,000 feet high, and valleys several thousand feet less in altitude. Along my route through Honan, it composes the table land between Juchau and Honanfu, and envelopes on all sides the lower portion of the ranges of the Sung-shan. The bottom-land of the Loho is bounded on both sides by vertical cliffs of loess, and the same formation reaches on the southern side of the valley, to the height of more than 1,200 feet. The southern bank of the Yellow river consists entirely of loess. I did not undertake the journey from Honanfu to the great bend of that river, because I had sufficient reason to expect, positively, that I would find nearly the whole of that region consisting of rolling hills of loess.

The peculiar feature of this formation is, to spread alike over places which differ much in altitude, and, therefore, to fill the gaps between hills, to smoothe away the uneven surfaces of mountainous countries, and to create the conditions for agriculture and prosperity, where they would not exist without it. From descriptions given by Chinese, who apply the specific name of "hwang-tu" to the loess, it appears, that the same formation exists on a still grander scale in Shensi, making up the slopes of the broad valley of the Wei river, and the entire country of the Ordos; and it spreads, probably, as a cover of great thickness, far into Kansu and Central Asia. It is the loess which gives to the Hwangho its yellow colour. Large quantities of it are washed down from the hills by every rain, and are carried by the rivers into the plains, and ultimately into the sea. The sediments which constitute the great plain, and render the gulf of Pecheli and Yellow sea so shallow, are chiefly derived from the destruction of the cover of loess.

The loess is among the various substances which would commonly be called "loam," because it is earthy and has a brownish yellow colour. It can be rubbed between the fingers to an impalpable powder, which disappears in the pores of the skin, some grains of very fine sand only remaining. By mechanical destruction, such as is caused by cart-wheels on a road, it is converted into true loam. When in its original state, it has a certain solidity and is very porous, and perforated throughout its mass by thin tubes, which ramify like the roots of grass and have evidently their origin in the former existence of roots. They are incrustated with a film of carbonate of lime. Water, which forms pools on loam, enters therefore into loess, as into a sponge, and percolates it, without in the least converting it into a pulp or mud. The loess is everywhere full of organic remains, but I have never seen any other than land-shells, bones of land animals, and the numberless impressions of roots of plants. It is not stratified, but has a strong tendency to cleave along vertical planes. Therefore, wherever a river cuts into it, the loess abuts against it, or against its alluvial bottom-land, in vertical cliffs, which are in places 500 feet high; above them the slopes recede gradually, in a series of terraces with perpendicular front faces. Where the river washes the foot of such a wall, the progress of destruction is rapid; the cliff is undermined, and the loess breaks off in vertical sheets, which tumble into the stream, to be carried down by the water. Such is the case along the southern bank of the Yellow river near Kung-hien and Sz'shui-hien, and probably in many other portions of its course. The beds of the affluents which join the river in these places, are no less deeply cut into the loess, and ramify into its more

elevated portions like the roots of a tree, every small branch a steep and narrow gulch. It would lead us too far astray from the objects of this letter, to describe more in detail the exceedingly curious features which the scenery of a region composed of loess presents. Among the most noteworthy is this, that it gives habitation to many millions of human beings. You walk on the richly cultivated bottomland of a river, and yet do not see a single human dwelling. But as soon as you approach the precipitous wall of loess, on either side, you find it thronged with people like a bee-hive. They live in excavations made in the loess.

As regards the mode of origin of this formation, the loess of China, like that of Europe (where it exists on a comparatively small scale), has been supposed to be a freshwater deposit. This supposition is erroneous as regards the loess of northern China, because it extends equally over hills and valleys, and does not contain freshwater shells. Others have therefore considered it as a marine deposit. This view is more erroneous even than the former, because it would presuppose the whole of northern China to have been submerged at least 6,000 feet beneath the level of the sea, in a recent epoch, while there is abundant evidence to prove that such has not been the case. Nor can the theory current in Germany, that the loess of that country was produced by glacial action, be at all applied to the loess of northern China, from various obvious reasons, too lengthy to explain here. Unbiassed observation leads irresistibly to the conclusion, that the loess of China has been formed on dry land. The whole of that vast country which was covered by a continuous sheet of loess, before this had undergone destruction was one continuous prairie, probably of greater elevation above the sea than the same region is now. The loess is the residue of all inorganic matter of numberless generations of plants, that drew new supplies incessantly from those substances which ascending moisture and springs carried in solution to the surface. This slow accumulation of decayed matter was assisted by the sand and dust deposited through infinite ages, by winds. The land shells are distributed through the whole thickness of the loess, and their state of preservation is so perfect that they must have lived on the spot where we now find them. They certainly admit of no other explanation, than that here hinted at, of the formation of the soil in which they are imbedded. The bones of land animals, and chiefly the roots of plants, which are all preserved in their natural and original position, give corroborative evidence. This is not the place to carry these geological deductions further than I have done. I hope that what I have said, in regard to the loess, will contribute to direct the attention of travellers in northern China to this interesting formation, from the study of which we may expect valuable data for the knowledge of the condition of things in China, in prehistoric and early historic times.

The practical importance of the loess is based on some of its prominent properties. In the first place, it is a productive soil. If northern China had a more favourable climate, it would rank among the most productive countries in the world, on account of the general distribution of the loess. It is very probable that it did rank high in this respect, in early historic times, when the mountains were wooded and kept the climate moist. The entire surface of the loess is at present under cultivation. But owing to its property of being easily percolated by water, it needs more frequent and prolonged rains than most other kinds of soil, and if rain fails in time of sowing, then the tilled ground will be carried away by the winds, the seeds exposed to the sun and not germinate at all. I travelled for days through regions where such had been the case this year, and the otherwise fertile country had an extremely arid aspect. Another important property is the tendency to vertical cleaving. It creates the conditions for cheap dwellings, of which a large proportion of the population avail themselves. To it, too, is due the rapid progress of denudation. The rivers which carry away the loess separate it into its constituent parts, viz. the sand, the loam, and the carbonate of lime. The latter is probably carried in solution into the sea, while the very fine sand and the loam are separately re-deposited, creating, here an arid soil, and there, a fertility which exceeds that of the loess itself. The sandy regions prevail where the rivers emerge from the mountains, while the rich alluvial loam is carried to the lower country. It would be of interest to have a geological map of the great plain, with the formations of loess, sand, and alluvial loam marked separately.

8. *Region of Hwai-king-fu.*—

The northern bank of the Yellow River is flat, and in this region not protected by embankments, because the land rises slowly towards the north. After crossing a belt of fine sand, resulting from the deposition of the sandy component of the loess, and marking the extent of ordinary inundation, another kind of soil is reached, which is a sandy loam of moderate fertility. Then follows the region of Hwai-king-fu and Ching-wha, which is one of the most beautiful spots in the plains of China. It is a perfect garden, rendered park-like by numerous plantations of trees and shrubs, among which thick bosquets of bamboo contrast with gloomy groves of cypress. The picturesque outlines of the neighbouring Tai-hang-shan range form an admirable background. The soil is very fertile, being in fact a fine extract of loess, and well manured. The luxurious growth of the cereals recalls to mind the richest agricultural countries in Europe. Numerous streams of clear water descend from the Tai-hang-shan, and the inhabitants make the amplest use of them for irrigation. The density of the population surpasses belief; I do not recollect to have seen a more thickly settled region in China. In consequence, the extraordinary produce of the fields is but little more than sufficient to nourish its own growers, and the quantity of grain exported is small in proportion to what is raised.

The city of Hwai-king-fu is large, but not the seat of much trade. It is far surpassed, in this respect, by the mart of Ching-wha-chin (清化鎮,) 35 li north-east, which is the great depôt for the coal from the neighbouring mines, for iron and coal from Tse chau-fu in Shan-si, for the varied produce of the plain, and for all goods imported from Tientsin via Tankou. The town is exceed-

ingly populous, and, to all appearance, a very large amount of small business is trans acted there. The main street is over a mile in length, and was thronged with four-wheeled and two-wheeled carts, wheel-barrows, coolies and pack animals, when I passed through it.

Wheat and barley are the staples of the agricultural produce of this plain. Both are sown in November and harvested in June. The second crop consists chiefly of millet. Neither cotton nor poppy are planted, and tobacco is raised only in small quantity. Besides grain and flour, the exports from Ching-wha consist of anthracite, iron castings, wrought iron, pig iron, pottery, bamboo ware, and fruit. Two other articles of export are peculiar to Hwaikingfu. One consists in steel ware, such as razors, scissors, knives, &c., for the manufacture of which Hwaikingfu is celebrated ; the steel is imported from Wu-hu and Hankow. The other is a costly medicinal root, by the name of Ti-hwang (地黃,) which does not thrive in any other place in China, and is therefore exported in all directions of the compass. This Ti-hwang consists of dried bulbs of the size of potatoes, and is quite different from tai-hwang or rhubarb. It is sold at 850 *cash* per cattie, and the total quantity which is yearly exported is said to represent a value of from Tls. 800,000 to one million.

The trade of Chingwha takes various directions. There is a lively intercourse with a small shipping place on the Yellow River, at the distance of 70 li, whither anthracite, iron, and pottery are carried, to be shipped ;—1st down the river, to Pien liang ching and Lungmenkou, whence they are distributed by land east and south, as we are informed by Mr. Elias ; 2d. across the river to Sz'shiuhien, and then by land to Mi hien, Juchau, and Lushan hien; and 3rd, up the river to Mang-tsin-hien, Honanfu and the western country. Tobacco from Hupè, hemp and cotton go in return from the south to Ching-wha. The most important trade roads are, eastward to Sinwu-hien and Tankou-chin, and northward and northwestward to Shan-si. In regard to the latter, I will say a few words when treating on that province. Tan-kou takes a great portion of the mineral and metallurgical produce of Shansi, besides grain from Hwaikingfu, and sends, in return, the imports which it receives from Tientsin. The ratio in which foreign goods are represented among these is surprisingly small.

9.—*Mines of anthracite at foot of Tai-hang-shan.*

The name Tai-hang-shan (大行山), is the popular denomination for an apparent mountain range that is visible from the great plain, first to the north and then to the west, on the whole line of the high road from Hwaikingfu to Wei-hwui-fu, Shunte-fu, and Ching-ting-fu, a distance of about 1,200 li. I shall show on another page, that it is only the descent of the highlands of Shansi, and no real mountain range ; but it affords another of those rare instances of the general use of a uniform denomination for a mountainous region of great extent in length. It is in use on Chinese maps, as well as with the people of the country.

The Tai-hang-shan slopes down into the plain of Hwaikingfu, along a nearly straight line. At several places, a belt of low hills intervenes between the foot of the mountains and the plain. They are the seat of the important coal mines of the Tai-hang.shan, as they are called by the Chinese. The westernmost mines I know of are in the district of Tsi-yuen-hien, the easternmost near Sin-wu-hien. These two places are about 150 li apart. Between both are the best of the range. The coal which is mined in these is the same excellent kind of anthracite that is characteristic of eastern Shansi—clean, very lustrous and solid. The mines of Ching-wha are far more favorably situated than those of Shansi, but on the other hand the coal mines of this province offer more facilities for extraction, and the anthracite which they yield is slightly superior in quality to that of Ching-wha.

The coal district of Chingwha is about twenty li long and five li broad. The number of mines which are worked was given to me as about one hundred, and this figure is probably not far from the truth. The remnants of worked out or otherwise abandoned mines, are far more numerous. There are places where twelve or fifteen shafts are in close vicinity to each other. One can easily account for this want of a uniform system of working, if it is considered that the size of mining property varies from ten to forty *mow*. All mining is done on one coalbed only,which varies in thickness from 4 to 30 feet, and averages probably more than 12 feet. Work is done through vertical pits, which are from 120 to 400 feet deep; their shape is cylindrical, with a diameter of five feet. The sides are secured by wicker-work. A large windlass, turned by eight men, serves for hoisting; the coal is raised in baskets containing 120 to 130 catties each. At the ten largest mines, the daily extraction of coal is said to be 1,000 baskets, or 70 tons at each. As this figure allows an interval of three minutes between the raising of every two baskets, and the speed of extraction was rather greater during my presence, I have no reason to doubt the veracity of the statement. I may here remark, that I found the people of this region in general remarkably truthful in answering questions. It is difficult to estimate the quantity of coal which is yearly extracted from the mines of this district, as the scale of work diminishes and increases, according to the number of hands required for field-work at the diferent seasons. From 200,000 to 300,000 tons annually, is probably not far from the actual produce. I do not know of any other mining region of equal size, in China, where this figure is attained. The reason is, that the coal, without any noteworthy competition, finds a ready market, firstly for domestic use in the populous region of Hwai-king-fu ; secondly, along the Yellow River ; and thirdly, along the Wei-river below Sinwu and Tankow. The selling price at the mine is 100 *cash* per picul for ordinary coal, and 150 *cash* for the largest lumps, of several cubic feet in size. At Chingwha, 28 li from the mines of Lifang, which are the most productive of the district, the selling price is 250 *cash* per picul ; on the Hwangho, 100 li from the mines, it is 500 *cash* ; this is the price, too, at Suwu-hien, the head of navigation of the Wei-ho. If the mines were worked by steam-power and connected with Sinwu by

a tramway, then the anthracite of the Tai-hang-shan might be delivered cheap enough at Tientsin, to compete with that from Fang-shan-hien near Peking, to which it is superior in quality.

The area covered by the present openings in the several districts of the Taihang-shan is of inconsiderable extent. Those districts are few and wide apart. But the unity in structure of the belt which they constitute together, along the foot of the mountains, renders it probable that the coal-measures continue under the surface deposits of the plain, not alone throughout that belt, but also in the direction of the Yellow River. The present explorations, which have in some instances reached the plain, confirm this conclusion. But as the coalbed sinks here to greater depth, and as at 400 feet below the surface too much water is encountered to allow the Chinese to proceed any further, these portions of the coalfield will be reserved till such time as more perfect methods of mining and intercommunication are introduced. The coalfield under consideration is now the most important on the western borders of the great plain; but it is destined to occupy a much superior position in the future.

10. *The Gate of Central Asia.*—

I have dwelt at some length on the vicinity of Ju-chau, Honanfu and Hwaikingfu, believing that it is a region destined to be of great importance in the future commercial relations with more remote countries. Considered for itself alone, it may claim some attention. It is exceedingly populous, and, although the people have few wants beyond those which they are able to satisfy by their own labour and from the produce of their own fields, yet the supply even of these wants is a basis for no inconsiderable trade, where so many millions of people are concerned. It is also rich in agricultural and mineral productions, and although it furnishes no article of export to foreign commerce, the money which the people are able to earn will eventually buy foreign goods, and any stimulus which is given to an increased production (chiefly of minerals) will be in the end beneficial to foreign commerce.

The great prospective importance, however, of the region under consideration, is founded on its geographical position. The passage of Honanfu is the only future gate to the northwestern provinces and Central Asia, from the east. It does not occupy this position at present, nor will it ever do so before rail-roads shall be built. I hesitate to touch this subject, which to many appears visionary, though probably no foreign resident in China entertains doubt as to the necessity that railroads should, and the certainty that in the course of time they will, be built. But if one speaks of the possible means that may be devised, to raise to their true value the resources of northern China, one cannot avoid this question; and if anywhere in China it is here, in the region of Honanfu, where the introduction of modern means of conveyance suggests itself as a step which will be attended with an incalculable change of conditions. If one has travelled for some time in the southern and central provinces, where communication by water allows of a slow but cheap transportation of goods from the seaports to distant regions, and valuable articles of export converge from remote provinces to these same ports, and if one enters then the northern provinces, where the only existing communication by water admits of the carriage of goods from the seaports to a few marts situated some hundred miles nearer to the regions which are to be supplied, all the other conveyance having to be done by the most imperfect means, then one is fully aware of the great disadvantages under which these northern provinces labour. I have already remarked, that freight by land is from twenty to forty times more expensive then it is by water. Prices increase therefore rapidly with the distance from the places of supply, and commercial intercourse does not rise beyond its lowest possible limit.

This is one of the reasons why the importance of the northwestern provinces is usually underrated. Shansi is the only one of them which I have seen. I will speak more fully in regard to it in the course of this letter. The province of Shensi is considered by the Chinese as a sort of Eden, as a land of plenty, where one good crop furnishes sufficient food to last during ten successive bad years, an adage which characterizes perfectly the condition of things, expressing as it does, that superabundance does not much benefit the country unless followed by scarcity, because there is no means of disposing of the surplus. As regards the province of Kansu, it appears to be far more productive than is ordinarily supposed. The city of Su-chau-fu, for instance, is situated, according to our maps, in the deserts of Central Asia. Yet I met an individual from the fertile province of Honan, who had emigrated ten years ago, to farm land near Suchaufu, and professed to have succeeded well, until he was driven back by the rebels, a few months ago. He described that whole portion of the province of Kansu, through which he had passed, as generally fertile. Similar statements, though not with reference to distinct regions, were given to me by others.

The only noteworthy articles of export, from Shensi and Kansu to other provinces, appear to be medicines and opium, both of them articles which, on account of their high commercial value, are almost independent of the state of the means of inter-communication. There is nothing which would so much counterbalance the injury done to foreign commerce, by the sale of a highly esteemed quality of opium, than to put foreign manufactures and other imports within easy reach of the growers of that opium. The only practicable means of easy and cheap ingress to those regions, and through them to others far more remote, will be a railroad by way of the Honanfu passage. The physical features of eastern China allow only of this one and no other passage. There is no one possible farther south, nor any to the north, excepting, perhaps, one through Siuen-hwa-fu and southern Mongolia, which would, however, go through thinly inhabited and almost unproductive regions. Attention should therefore be concentrated on the Honanfu passage. The two coalfields which I mentioned, north and south of the Yellow River, will eventually be of great importance. There will probably be, in future, one railroad from the southeast, approaching the Yellow River by way of the coal-field of Juchau, and continuing south of the river to Shensi; while another, from the northeast, will receive its supply of coal in passing the coalfield of the Tai-hang-shan, and cross the Yellow River in the vicinity of Hwai-king-fu. Both would pass altogether

through populous and productive regions, and would jointly be continued, in the course of time, to the far west and northwest. There are probably no difficulties to be overcome to the western portion of Shensi; and I am informed that no one high mountain pass is to be crossed, throughout the province of Kansu, along the line of the present waggon road.

I said that, with the condition of the present roads, Honanfu does not occupy the position of a key to the northwestern province. Shensi and Kansu are chiefly supplied from Hankow directly, via Lao-ho-kou. Besides, they are frequently approached by travellers from Peking via Shansi. Few goods and travellers enter Shensi by way of Honanfu, though, as I have already noted, there is a considerable local traffic between that place and Shensi, consisting chiefly in cotton raised in the vicinity of Honanfu, and iron from Tsechaufu, in Shansi.

There is considerable room for an increase of the productions of the northwestern provinces, chiefly on account of the general distribution of coal, and probably of iron ore, through them. The present profits of the manufacturer of iron in Shansi are very small, owing to the great increase in price that attends the conveyance of the iron even to the next marts. If this price is reduced, the manufacture of iron, though already large, will vastly increase. The trade in coal, for domestic use, will attain very large dimensions, when it shall be possible to put good coal within reach of many millions of people that are now without it.

Province of Shansi.

On my arrival at Hwaikingfu, I learned that the road marked on European maps as connecting that city with Pingyangfu, in Shansi, is a bridle path, and that no waggon road leads into and through Shansi, excepting the great highway from Peking to Si-ngan-fu, which enters Shansi west of Chingtingfu, and leaves the province at the Tungkwan, on the great bend of the Yellow River. As the journey by way of the Tungkwan did not promise any results of importance, I dismissed my carts, though they were paid nearly to Peking, and hired pack and riding mules, with which I performed a journey of 34 days to Peking. I would advise all travellers who should hereafter desire to visit Shansi, to travel on horseback, as the cartroads are in a dreadful condition, and waggons can scarcely at all go off the great monotonous beaten track.

There are two trade roads from Hwai-kingfu into Shansi, one by Tsechaufu to Lu-ngan-fu, and thence by Tsin-chau to Tai-yuen-fu; the other by Tsi-yuen-hien, Yang-ching-hien, Tsin-shui-hien, I-ching-hien, to Pingyangfu. I followed the first of these roads into the department of Tsechaufu, and then went westward, on small mountain paths, to Tsin-shui-hien, where I struck the second road.

1*st*. *General structure of the southern half of Shansi.*—

The instances are very rare when the geologist has occasion to get, on a tour of hasty reconnaissance, as clear a conception of the structure of an extensive mountainous country, as he is enabled to get in regard to the southern half of Shansi, from the Hwangho to beyond Tai-yuen-fu, an area of about 30,000 square miles. There is such a grand simplicity in this structure, that I cannot refrain from attempting to give you a sketch of its general outlines; it is, also, indispensable to known something of the geology of Shansi, in order to understand what I shall have to say in regard to its mineral wealth.

The plain of Hwaikingfu is bounded to the north by what, from there, appears to be a mountain range, straight as a wall, steep, castellated on the top, and elevated about two thousand feet above the level of the plain. Its foot consists, in places, of the coal-measures, as I have described. The wall itself is limestone, nearly horizontally stratified. On reaching its summit, one is surprised to see spread out an undulating table-land, varying in altitude from 2,500 to 3,000 feet* above the plain. The surface of this plateau consists of the *coalbearing strata*, which overlie conformably the limestone. I will presently describe it as "the coal and iron region of Tsechaufu." Leaving out of consideration some slight irregularities, the stratification is in the main horizontal. About forty miles from the margin of the plateau, one arrives at a second rise, and ascends to another plateau, nearly 6,000 feet above the level of the sea, and 5,000 above that of the plain of Hwai-kingfu. This plateau is built up of post-carboniferous strata, which consist of a series of sandstones, shales, conglomerates, &c., of green, red, yellow, lilac, and brown colours.

As they are conformably superposed on the coalbearing strata and the limestone, it can be said with almost absolute certainty, that both of these continue underneath the post-carboniferous, nearly or quite as far as this formation extends. The surface of the second plateau appears undulating, when overlooked from a high point, but in fact it is deeply eroded by many ramified watercourses, which constitute the system of the Tsin river. The erosion is here generally not deep enough to bring to view the coalbearing strata. In a few places only, belonging to the district of Yang-ching-hien, they are exposed in the bottom of the valleys, and give origin to considerable coal and iron mining. The second plateau is about 170 li broad, where I passed over it. I left it by the famous Wu-ling pass which is about 5,000 feet high. Here begins a long and gradual descent westward, to the valley of Ping-yang-fu. Beyond it, the ground rises again, and a continuation of the Tsin river plateau is reached, extending between the Fuen river and the north and south reach of the Yellow River. The margin of the plateau, at the Wu-ling pass, trends about N. N. E.—S. S. W; the descent to the west though gradual in the main, is interrupted in some places by steep gorges. In these, as you may infer from the structure of the plateau, you descend rapidly through the whole series of post-carboniferous, down into the coalbearing strata. The sides of some of the gorges are therefore lined with coal-mines. They constitute the mining districts of I-ching-hien and Fau-shan-hien.

* All the altitudes as here noted are, of course, only to be taken as approximations, as it is impossible to compute barometrical observations exactly, where auxiliary stations do not exist. The figures given for the altitude of mountain ranges away from my road of travel, are merely estimates.

In the broad valley of Ping-yang-fu, the loess conceals nearly everything. A few hills only, situated southeast of the city, protrude above the monotonous yellow cover. They are of particular interest. Their geological structure proves them to be the southern continuation of the high range of the Ho-shan (霍山), which has summits of about 8,000 feet altitude, and runs parallel to the Fuen river, about thirty miles east of it. This is the only mountain range I came across, on my route through southern Shansi, that consists of ancient me tamorphic rocks and granite; it may, not inappropriately, be called the backbone of that region. It is chiefly remarkable as dividing a region of bituminous coal to the west, from one of anthracite to the east. The strata are similarly developed on both sides, but on one side they carry a great number of beds of bituminous coal, and no anthracite at all, while on the other, they contain only beds of anthracite, among which there is at least one of great thickness, while bituminous coal is here completely absent.

The range of the Ho-shan has existed before the deposition of the coal measures. It has therefore not exerted any other material influence on them besides the very curious one just mentioned. On the western side, as on the eastern, the limestone, coalbearing strata and carboniferous are, in the main, horizontally and conformably stratified, and the minute differences in the sequence of the strata are slight. In the department of Ping-yang-fu, the division is already conspicuous. The hills west of the Fuen river (belonging to the districts of Tai-ping-hien, Lin-fan-hien, Hung-tung-hien and Shau-ching-hien) are full of bituminous coal; while those to the east, which lie also east of the dividing line mentioned, yield anthracite (districts of Iching-hien, Fan-shan-hien, Yo-yang-hien.) Proceeding northward, to Ho-chau and Tai-yuen-fu, one remains altogether west of the Ho-shan range; consequently, none but bituminous coal is seen. The Fuen-ho and its affluents are here cut extensively, through the cover of loess, into the coalbearing strata. Mining localities are therefore very numerous. The hills to the west, north, and south of the plain of Tai-yuen-fu consist of the same coalbearing strata, covered by the post-carboniferous, with nearly horizontal stratification throughout. It is probable that these same formations and this same structure continue unaltered to the north, perhaps as far as the mining districts of Ta-tung-fu. Leaving the plain of Tai-yuen-fu, which has an altitude of about 3,000 feet, on its eastern side, and crossing the watershed between Hwang-ho and Pei-ho at Shau-yang-hien, all the hills around consist of post-carboniferous strata. The pass is about 5,000 feet high. The hills present the same appearance as those of the second plateau in the Tsin-river basin, of which they are the direct continuation, viz., an undulating plateau of about 6000 feet elevation, and deeply intersected by the ramified watercourses. At or near the pass, the imaginary line of continuation of the Hoshan range is crossed. East of the pass, the road descends into lower and lower strata of the post-carboniferous, and in the district of Ting-ting-chau reaches again the coalbearing strata, which here carry anthracite.

In this region, the belt of coal-croppings, which is the direct continuation of the first plateau of Tse-chau-fu, is narrow. Going east, the limestone is soon reached. Now only begins, geologically speaking, the eastern descent of the plateau of Shansi. From Hwai-king-fu, through the centre of Shansi, to Ping-ting-chau, the province presents the spectacle of an extraordinary simplicity of structure. This ends with the coal and iron district of Ping-ting-chau. East of it, considerable disturbances have left their traces in dislocations of the lime stone, and the coalmeasures take part in them. The road passes through a picturesque defile of narrow gorges, cut deep and steep into the limestone. Between them there is now and then a piece of undulating ground. It marks the existence of an isolated remnant of the coal formation, and there are some mines in nearly every one of these places. But with the regularity of stratification the good quality of the coal is gone. Although, in the beautiful valley of Tsing-king-hien, the coal formation occupies once more a considerable space, the fact that trains of donkeys, loaded with anthracite from Ping-ting-chau (130 li west), and bound for the plains, are constantly passing Tsing-king-hien, gives ample evidence of the great superiority of the fuel from the former place.

Before arriving at the plain, one has still to cross a range of high and rugged mountains, which is of great interest. It consists of certain strata of Silurian age, which play an important part in the geology of northern China, but which I had not met before in Shansi. They cause the serrated outlines and highly picturesque character peculiar to the "western mountains" as seen from the plain between Peking and Ching-ting-fu, and probably as far south as Chang-te-fu.

Reviewing the main features of the geology of southern Shansi, we have then:—1st, a rugged eastern barrier, made up of ancient formations; 2nd, a general substructure of limestone, in regular and little disturbed stratification. If all the superincumbent strata were removed, it would present the appearance of a nearly level plateau with more or less steep descents, varying in altitude from 2,000 to 3,000 feet, and interrupted only by, 3rd, the granitic and metamorphic Hoshan range; 4th, a system of coalbearing strata, about 500 feet in thickness, covering the plateau of limestone, carrying bituminous coal west of the Hoshan, anthracite east of it, and everywhere a large quantity of iron ore; 5th, the post-carboniferous strata, about 3,000 feet thick, and not containing any useful minerals. If no erosion had taken place, its surface would be a nearly level plateau of about 6000 feet altitude. But we have, 6th, the marks of a considerable eroding and denuding action, which has carried away the post-carboniferous from large areas, but has left it in its original position in others of still greater extent. Where it exists, it forms undulating highlands, intersected by deeply cut watercourses; where it is removed, the coal formation is laid bare, and in places even this is washed off and the limestone floor exposed. 7th, A general cover of loess spread over hills and valleys, and covering the highest plateaux as well; it borders the great plain. It is intersected by labyrinthic watercourses, most of which are cut through loess into the underlying formation.

From the description of these simple features, it will be seen that Shansi is one of the most remarkable coal and iron regions in the world; and some of the details which I will give will make it patent, that the world, at the present rate of consumption of coal, could be supplied for thousands

of years from Shansi alone. Professor Dana, in comparing the proportions in which, in different countries, the area of the coal land is to the total area, says :—"The State of Pennsylvania leads the world, its area of 43,960 square miles embracing 20,000 of coal land." It is very probable that, on closer examination, the province of Shansi in China, with an area of about 55,000 square miles, will take the palm from Pennsylvania, by a considerably more favourable proportion. But this is not yet all the advantage on the side of the Chinese coalfield. Another is afforded in the ease and cheapness with which coal can be extracted on a large scale.

On the other hand, the whole of this great coal and iron region labours under two great disadvantages. Firstly, it is situated a distance away from the coast, and from rivers that are fit for other navigation than by small Chinese boats ; and secondly, the whole of the coal formation rests, as it were, on a platform raised a few thousand feet above the adjoining plain. Its steep descent to the latter will not form an obstacle, but at least offer great difficulties, to the construction of a railroad, which will be the only means of ever bringing to account the mineral wealth of Shansi.

I will now enter into some details, which may serve as illustrations to the foregoing general remarks.

2. *Ascent from Hwai-king-fu to the first plateau.—*

Both roads which I have mentioned climb the Tai-hang-shan, that is, the descent of the first plateau, in steep places. That to Tse-chau-fu is a bridle path, from fifteen to twenty feet wide, well paved and kept in repair, and probably of great antiquity. It is lined with tea-houses and restaurants, and on the plateau there are many villages on its side. Of all roads I have seen in China, there are few where a carrying trade is done equal to what it is on this one. From the number of coolies, mules and donkeys which I met, I calculated that no less than 150, and probably as much as 300, tons of freight are carried daily over this road from north to south. Of this amount there are about 60 per centum of iron, 30 of anthracite, the rest, of ten per centum, consisting of various articles, such as Kauliang brandy, camels hair, certain descriptions of pottery, medicine etc. Most men and animals return empty, others carry flour, various kinds of grain, cotton cloth, bamboo ware, etc. I saw a train of mules laden with Chinese cotton goods, that were manufactured at Tien-men near Hankow, shipped from there to Shī-ki-chin, and were now destined for Tai-yuen-fu, where they appear to compete successfully with foreign manufactures imported by way of Tientsin.

It appears that there is not a single waggon road from the plain up to the first plateau, excepting the Peking Tai-yuen-fu high-road. Of the bridle-paths, none follows the course of a river. Those streams which descend into the plain, at Hwai-king-fu, as well as at Ching-ting-fu, break through steep and rocky gorges of limestone where they issue from the first plateau, and this is probably the nature of all of them along the whole extent of the margin of the plateau. As the knowledge of the Chinese of the construction of roads does hardly embrace the first principles of this branch of engineering, and as they possess neither skill nor energy in removing obstacles, but are endowed with an infinite amount of patience in overcoming the same natural difficulties day by day, they have never attempted to improve their means of communication with Shansi.

3. *Coal and iron region of Tse-chau-fu.—*

This mining region constitutes what I have called the first plateau. It is more favourably situated in relation to the plains than any other portion of Shansi, and has probably furnished more iron to the Chinese than any other region of similar extent in the Empire. Its vicinity to the populous plain of Hwai-king-fu, to the Hwang-ho, to Tankow (道口鎮) and Siu-wu-hien (the shipping places for Tientsin and the Grand Canal), and to Honan-fu, may have made it a market for the iron in old times. The occurrence of temples built by the dynasties which resided at Honan-fu, and situated near the present roads of traffic, renders it probable that the iron industry flourished here more than a thousand years ago. The same methods for getting the metals out of the ores were probably then applied which I witnessed on my visit. They bear the character of nearly all Chinese industry : rude, petty in the extreme, and yet remarkably perfect. If one encounters on the road, incessantly, trains of mules and men, laden with ironware of the most varied description, one is prepared to see the metal manufactured on a somewhat large scale ; and it is surprising, on arrival at the spot, to see hundreds of small establishments, between which the labour is divided, each of them manufacturing a certain set of articles, for which they may have gained a reputation.

Iron ores occur abundantly in several strata of the coal formation. The Chinese apply only one kind of it, which melts easily without the addition of any flux. It consists of a mixture of clay iron ore and spathic ore, together with limonite and hematite, and occurs in irregular accumulations in certain limestone strata, at the bottom of the coal formation. Tai-yang-chin, 60 li northwest of Tse-chau-fu, and Kau-ping-hien, are the only places where all the iron produced in the district is melted from the ores. Nothing at all approaching in appearance a European high furnace is in use. The smelting place is an inclined plane, eight feet long and five feet wide. It is enclosed on the two long sides by loam walls four feet high, the third side and the top are open, and on the fourth side it joins a small and low hut which contains the wooden bellows and the two men who pull it. The floor is covered with a layer of pieces of anthracite of the size of a fist. Upon this are put about 150 crucibles of fireclay, 15 inches high and 6 inches wide, containing a mixture of small pieces of anthracite with crushed iron ore. All spaces between them are carefully filled with anthracite, and another layer of pieces of this fuel put on the top. In other regions, the smelting places are 15 by 5 feet, and contain 300 crucibles, the charge is then ready for igniting. At Taiyang, a second layer of 150 crucibles, is put on the top of it ; this is again covered with anthracite, and finally with a layer of old crucibles. This pile is now ignited, and air blown in ; when the heat is

strong enough the blast is stopped, the air which gets access through the spaces between the pieces of glowing anthracite being sufficient to keep up the heat. Two kinds of pig-iron are produced, one for making cast ings, the other to be converted into wrought iron. In the former case, the crucibles are taken out when the heat is strongest, and the iron poured out on a flat bottom, so as to form thin sheets. This is a white, hard cast-iron of apparently great purity. For the second purpose, the pile is left to glow and cool for four days. Then the crucibles are taken out and destroyed. The iron has collected in each in a single semi-globular piece. The pigs from Kauping are carried to various places in Lu-ngan-fu, those from Taipang to Nan-tswun, ten li west of Tse-chau-fu. The foundries at this place, for making cast-iron ware, are exactly the same kind of smelting places which I have described of Tai-yang. For the manufacture of different articles, different mixtures of pig-iron are used. The rapidly cooled flat sheets are most applied. For certain articles, the slowly cooled semi-globular pieces are added in varying proportion ; while for others still, a third kind of pig-iron is added, which appears to be produced by pouring molten iron in water, so as to form drops, which are very hard and brittle. It is probable that the known excellence of Shansi iron ware is partly due to the application of these mixtures, in proportions which are the result of long experience, and that the particular fame enjoyed by certain brands is owing to trifling differences in manipulation, of which certain individuals are in possession. There are other establishments at Nan-tswun for the manufacture of wrought iron, which is only made of the semi-globular pigs. I will not tire you with a further description of the processes used. They are as rude and simple in this as in the first case, and yet the material produced is of such superior quality, that the Chinese prefer the Shansi wrought iron to the imported European, if the prices of both are equal. Not any steel is made in Shansi. All that is used is imported from Wuhu and Hankow. To work it up into small articles of use, Shansi iron is added to it. All manufacturing of this kind is done by single workmen, at their homes. The same is the case in regard to many other articles. At Tai-yang, for instance, a large amount of iron wire and needles is made. I could not see how this is done, because I would have had to enter private houses where the whole family is at work.

Castings and wrought iron are both sold, at Nan-tswun, at 20 *cash* per catty. Nearly all of it is carried to Chingwha, which is the great depôt. The distance to that place is 100 li.

Tai-yang and Nan-tswun are both situated in Fung-tai-hien, which is the city district of Tse-chau-fu. The name of Fung-tai iron or Fung iron is therefore locally used for all iron from the district. The more common trade name is Lu iron. It is derived from the departmental city of Lu-ngan-fu, to which Tse-chau-fu was formerly subordinate. The only other district in Tse-chau-fu where iron is made is Yang-ching-hien, but this yields a far less quantity.

It is evident, that the great success which the iron manufacturers of Tse-chau-fu attain, by application of the apparently rudest methods, must be due, in a great measure, to the superiority of material they apply. It is the few hundred feet of productive coal formation, which furnishes them an abundance of every kind of material they require—firstly, an iron of great purity, rich in metal and easily fusible ; secondly, all sorts of clay and sand, such as are required for crucibles, moulds etc. ; thirdly, a very superior anthracite.

Anthracite is mined in many places of Fung-tai-hien, Ling-chuen-hien, Kau-ping-hien, Yang-ching-hien. The only district of Tse-chau-fu that contains no mines is Tsin-shui-hien, for the reason that the watercourses are not cut deep enough through the post-carboniferous to expose the coal formation. The first mines which I had occasion to examine are in the Ching-pu-shan, about 100 li north-northwest of Ching-wha. The coalbed is slightly inclined, and has a scarcely perceptible thickness where it crops out on the hill-side. The works consist in a very crooked tunnel which follows the coalbed. At a few hundred feet distance from the entrance, the thickness of the coal increases 20 to and 30 feet. It appeared to me that nearly all the mines of the department are worked on this same bed, which ranges in thickness everywhere between 12 and 30 feet. The anthracite is of black colour, of large conchoidal fracture, very lustrous, very clean (it does not blacken the fingers by handling), and has a great firmness. Two-thirds of the yield reach the surface in pieces of at least one cubic foot in size, and the rest consists mostly in smaller but solid pieces. The lumps are sold at 40 to 50 *cash* per picul. The rest is taken away in baskets by children, for domestic use. They fill their two baskets and pay two *cash* for each, which is at the rate of 10 *cash* per picul. The lump coal is car ried to Chingwha, where it is sold at 400 *cash* per picul ; that is, at the distance of 100 li, about tenfold the price paid at the mine. The reason that this anthracite sells readily at that price, when Tai-hang-shan coal is only worth 250 *cash*, is that its greater solidity allows of a more convenient transportation of the lumps to distant places. In all other respects these two kinds of anthracite are nearly alike. They give out an intense heat and keep it for a long time. The residue is a small amount of fine and perfectly white ash. The coal gives scarcely any sulphurous smell in burning ; the only noticeable impurity consisting in a few earthy streaks, varying in thickness from that of a knife-blade to an inch. It burns to a light white clinker.

The other mine of Tse-chau-fu has the advantage of a market such as Ching-wha. But several are situated in the neighbourhood of ironworks, which, of course, consume a large quantity of coal. In most instances, however, there is nothing to supply but the domestic wants of the people living within a few miles of the mine. Competition is therefore great, and there are several mines, where the finest anthracite, apparently fully equal to the best of Pennsylvania, is sold at ten *cash* per picul, or thirteen cents per ton of 1,600 catties ; all of it lumps of several cubic feet in size.

The mining of coal, the manufacturing of iron, and the conveying of both to market employ a large number of men and animals. But notwithstanding its ample resources the country is poor. The profits are reduced to a minimum. Coal mines are of so little value, that legal conceptions, such as right, title and property, do not apply underground. Whoever wants to mine can do so. He makes a tunnel or sinks a shaft, at any place which is not occupied already by a mine, and

extracts as much anthracite as he can profitably sell from this extraordinary coalbed of thirty feet in thickness. Some mines are said to have been worked for hundreds of years. The expenses are small, as all the mines are perfectly dry, even those which are worked by shafts of 300 feet in depth. Underground miners, who receive elsewhere 200 to 300 cash a day, must here content themselves with wages of 100 cash. Yet the owners of mines are poor people. There have evidently been better times in this region, as one is justified in concluding from the great number of houses built with luxury, and richly adorned with fine work of sculpture. It is possible that the introduction of foreign wrought iron, into those districts which are accessible by water from the Treaty ports, has greatly reduced the amount of sale and total production of Shansi iron, and that the desire to supply as many as possible of the former markets has tended to reduce the original price of the iron, and consequently the profits of the manufacturer.

The road from Tse-chau-fu northward to Lu-ngan-fu is said to be easy, and passable by small four-wheeled oxcarts, which are much in use for the local traffic on the first plateau. I went westward, across the second plateau, through a poverty-stricken country whose inhabitants were nearly starving. The bottom of the steep gorges of the Tsin river is mostly covered with a profusion of boulders of hard sandstone, and very little room is left for irrigable land. Nearly all the cultivated ground is on the loess, which covers the heights partly at analtitude of from 5,000 to 6,000 feet. The crops there have been a failure during several successive years. And yet, the only fields which would give two safe crops in the year, those namely which are in the bottom of the valleys, are almost throughout planted with the poppy. The opium made from it is of an inferior description, and nearly all consumed by the inhabitants themselves, who are much addicted to this vice. They appear to have lost all energy, and bear their sufferings patiently, as long as they can fill their opium-pipe. These are the hardy mountaineers of China. I may mention, as a matter of curiosity, that there are some mulberry tree plantations in these elevated regions, up to the altitude of nearly 5,000 feet; a trifling quantity of silk is made.

4th. *Valley of Ping-yang-fu.*

The large city of Pingyangfu is situated in the valley of the Fuen river, which here expands to a broad basin with gentle declivities, and has all the elements of great productiveness, provided that the climate contributes in but a moderate degree to this result. With the exception of the rich loamy bottomland on the river, the soil consists of loess. On the eastern side, it slopes down, at the rate of 2 feet to 100 feet, from the altitude of 5000 and even 6000 feet to that of 2000 feet, which is approximately the elevation of Pingyangfu above the level of the sea. Travelling from east to west, one descends this gentle slope for one hundred li; but travelling from south to north is difficult, as the loess is intersected by gorges of from 1000 to 2000 feet in depth, which descend to the Fuen-ho. Looking upwards, their steep ramifications into the loess are endless and labyrinthic. Their bottom is partly cut into the underlying formations, which consist, in some of them, of the coal measures. The gentle slope of the loess is thus divided into a number of east and west ribs. Many villages are built on the top of them, and some are located in the bottom of the gorges. In these, too, are the anthracite mines of I-ching-hien, Fau-shan-hien, and Yo-yang-hien, where work is done under similar conditions, and prices have a similar range, (10 to 30 cash per picul, or 13 to 40 cents per ton) as in the mines of Tse-chau-fu.

West of the Fuen-ho, the gentle ascent of the loess is soon interrupted by walls of horizontally stratified limestone. Here is one of the great dislocations in the regular structure of Shansi. It trends from south to north. Adjoining the line of dislocation immediately to the east, are the mines of bituminous coal of Tai-ping-hien, Lin-fan-hien, and Hung-tung-hien. West of it, the limestone, which gives rise to some magnificent scenery, and is exposed in a thickness of about 1500 feet, is again regularly overlain by the coal formation. The latter forms an undulating plateau, about 4000 feet high, and is intersected by watercourses, which have exposed to view fine cross sections of the coal formation. It encloses here a great number of coalbeds, from a few inches to six feet in thickness. The mines belong to the districts of Shau-tshing-hien, Pu-hien, and Fan-si-hien. Their produce is almost valueless, and would be completely so if free competition was allowed. But the districts of supply are limited by law for every mining locality.

Iron ore occurs abundantly in the coal measures surrounding the valley of Ping-yang-fu, but it is not put to any use, as there would be no market for iron from this region. Mr. Williamson makes mention of iron foundries in Tai-ping-hien, but it is only old iron, which is there remelted with the coke of the district.

With the exception of paper and straw braid, Ping-yang-fu produces no articles for exportation. A small amount of cotton is planted, but not sufficient for home consumption, and some is imported from Honanfu. The grain produce must be large in favourable years. But the crops have been bad for three years past, and the sufferings of the people are great. Nearly all southern and foreign imports are taken from Tientsin. Freight from that place is 60 cash per cattie. Luxuries, such as sugar, tea, and rice, are therefore scarcely known. I was informed that the market for foreign manufactures is very limited. Yet the total of imported goods is considerable; and I am at a loss to explain, in regard to Shansi in general, but chiefly in respect to Ping-yang-fu, by what means the balance of trade is kept up. Iron and coal, besides a little pottery and paper, are the only exports from Shansi worth mentioning. They are exclusively supplied by certain eastern districts that are conveniently situated. It is likely, that these yield up a portion of their profits to the agricultural districts, such as Ping-yang-fu, in return for grain and opium, and that these latter are thereby enabled to buy imports from so distant a place as Tientsin.

I had occasion to observe, at a little distance from Ping-yang-fu, the mode inwhich *salt* is there manufactured. Some holes are dug in the alluvial soil, close to the Fuen river. A muddy brine

collects in them. A porous earth is moistened with it, and the water allowed to evaporate. This process is repeated several times, until the earth is well saturated with saline matter. It is then put in earthen pots, four or five feet high, having a hole in the bottom, and rammed tight. Pure well water is poured on the top of it. It percolates the earth very slowly, and escapes at the bottom in drops of concentrated brine. By evaporation saltpetre and salt are produced. The salt is impure, and sells at 20 cash per cattie. Government imports, besides, a considerable amount of a better sort of salt, from Tientsin, and sells it at about three times that price. In order to secure its sale, it is ordered that whoever buys native salt must purchase at least 30 catties at a time, while Tientsin salt can be bought by the ounce.

The chief place in Shansi as regards the production of salt, is a salt lake in Nganyi-hien (department of Kiai-chau), 70 li south of Ping-yang-fu. Great quantities of it are exported into Honan and to eastern Shansi. A third region where salt is manufactured is the plain of Taiyuen-fu. These three regions mark the places of deepest depression, in three distinct basins arranged from south to north. There are probably one or two more of these basins farther north, the last of the series being that of Ta-tung-fu, where salt is also manufactured. Their formation and that of the salt deposits in them, from which the brine rises to the surface, dates back from a very ancient period in the geological history of eastern China. It is probable that the manufacture of salt, on a much improved system, will be, at one time or other, the object of a far more important industry than it is at present.

Among the population of the department of Ping-yang-fu, and all others which lie on the great road, there are many men who have lived in other portions of China. From Ping-yang-fu, especially, they go as clerks to Peking; while those of Hochau and Tai-yuen-fu do an extensive banking business in various provinces. The home country, with its scanty resources, does not give them opportunity for bringing to account their mercantile talent, but they return to it with their earnings; and, although Shansi in its present state is by no means a wealthy province, there are many rich individuals living in it. It is said that they generally invest their money in enterprises in other provinces.

5. *Region of Ho-chau.*

The large basin of Ping-yang-fu closes north near the city of Ho-chau. Between this place and Lingshi-hien, the Fuen-ho breaks through rocky narrows, and has, still more than farther south, the character of a mountain stream perfectly unfit for navigation. The narrows are caused by the rising of the coal measures, together with the underlying limestone, which is here bent up so as to form a barrier between the basins of Pingyangfu and Taiyuenfu. The rocks are covered by loess, which also here is divided up into ribs at right angles to the Fuenho, sloping gently down to the west, and up to the high range of the Hoshan in the east. The road crosses two of these ribs, of about 1,000 to 1,200 feet elevation each, and is excessively bad. The gorges are cut through the loess into the postcarbon iferous and coal measures, and numerous coalbeds are exposed to view on the road-side and in nearly every gorge. A great number of small coal mines are therefore scattered on both sides of the Fuen-ho. They belong to the districts of Hochau, Ling-shi-hien and Kiau-hiu-hien.

The luxurious growth of grain, pulse, vegetables and poppy, on the irrigated fields in the bottomland near Hochau, formed, at the time of my visit, a marked contrast to those situated on the loess, which were dry and bleached, though the soil is capable of producing abundant crops in more favourable seasons.

6. *Plain of Tai-yuen-fu.*

The capital of Shansi is situated on the northern border of a level plain, which has an area of about 2,000 square miles, and is elevated about 3,000 feet above the level of the sea. It is a fertile and prosperous country, dotted with large and well built villages, besides two Fu and ten Hieu cities. In some places the soil is swampy; in others it is highly saline, so as to give origin to the manufacture of an impure kind of salt; and in the neighbourhood of the rivers which descend from the southern hills, it is covered with very fine arid sand. With these exceptions, the plain of Taiyuenfu is fertile, and well adapted for raising grain. Water is obtained in nearly every place, at the depth of from 12 to 15 feet; and the fields can therefore be easily supplied with the requisite amount of moisture, even in seasons of such extraordinary drought as the present one. The agricultural produce is varied, and extensive gardens are planted with vegetables, poppy, and fruit trees. No cotton is raised. The plain is intersected by a net of waggon roads, on which there is a lively traffic. The commerce appears to concentrate in a few places, such as Yü-tsz-hieu at the northeast end of the plain, Chang-lan-chin (張蘭鎮) on the southwest end, and Tai-yuen-fu. At Ki-hien, a celebrated fair of Mongolian ponies is held in October. Honan people come here to buy their stock.

Taiyuenfu enjoyed formerly a reputation for the manufacture of knives and swords; but this industry appears to be in no flourishing state at the present time.

7. *Surroundings of plain of Taiyuenfu.*

The plain of Taiyuenfu is on all sides enclosed by hills, so as to form a perfect basin; and owes its origin, evidently, to the filling up of a lake of equal area with the present plain. The water escaped through the steep channel which it gradually eroded through the barrier of coalbearing strata, between Ling-shi-hien and Ho-chau, and which is now used as a joint exit by the rivers which run through the former lake basin. The hills all around the valley appear to be similar in composition to that barrier. They rise from 1,000 to 1,500 feet above the valley on the southeast, and to as much as 2,500 feet on the northwestern side. Their outlines are gentle and undulating, owing partly to the loess which clothes them.

Coal is mined in many places on all sides, and in nearly every hien district of the valley; each mining place supplying the next adjoining portion of the plain. It is without exception bituminous coal, so far as I have seen it or enquired about it. Much of it is converted into coke. The coal sells at 10 to 60 *cash* per picul, or 13 to 78 cents per ton at the mines; the price varying less in regard to quality than in regard to the distance from the places of supply. The transportation to these is chiefly done by camels. I have seen in this valley very superior descriptions of coal. The best, which is extracted in large lumps, comes from the western and northern hills, chiefly the district of Tai-yuen-hien, and the hills east of Tai-yuen-fu. People said that the hills there are full of coal and iron. The principal mines are at Wo-fung-shan, 70 li southwest of Tai-yuen-fu. I did not visit them. Iron is smelted there from the ores, but not in large quantity. Sulphur is made at the same place.

8. *Coal and iron region of Ping-ting-chau.*

The passage across the watershed east of the plain of Taiyuenfu, is about 1300 feet above the latter, but owing to the difficulties which the loess offers to a convenient grading, the road has to ascend an altitude of 2,000 feet above the plain before reaching the watershed. Thence, the descent to the east is very gradual. All the rocks which are exposed to view underneath the cover of loess, are postcarboniferous. One descends through about 1500 feet of its nearly horizontal strata, before reaching the underlying coal measures. The first mines on the road are those of Shi-pa-tswi, 20 li northwest of Ping-ting-chau. A magnificent coal and iron region is reached on arrival at this place. The mines which are worked at present are situated in the three districts of Yü-hien, Ping-ting-chau and Loping-hien; there are none in Shau-yang-hien. The belt continues southward, from Loping to Ho-shun-hien, Liau-chau, and Lu-ching-hien near Lu-ngan-fu. But there are no mines of importance, on account of the difficulties of transportation, between Loping and Luching.

I visited Pingting and Loping. These places are situated at about the same absolute altitude with the plain of Tai-yuen-fu. Long, low ridges descend eastward, from the high pleateau of the post-carboniferous strata. Their lower portions and eastern ends consist of the coal measures, which thence extend underneath the post-carboniferous to the west. Several layers of anthracite are imbedded in them. Experience has taught the inhabitants, that a good sort of anthracite can only be got in those places where it is covered by at least a few hundred feet of rock. Notwithstanding the numerous out-croppings of coalbeds on the hill sides, the mines (at least all those which I have seen) are therefore worked by vertical shafts. They descend to the depth of from 50 to 300 feet, and some of them are said to have been in use for upwards of a hundred years. All the mines are dry, as the coalbeds are naturally drained. The thickness of the coal varies ordinarily from 12 to 20 feet, and in some mines attains 30 feet. Mining is very easy and cheap. The roof of that coalbed to which most shafts descend is a hard sandstone; a few pillars and walls of coal are sufficient to sustain it. All the rest of the coal is extracted. Where the shafts are from 200 to 300 feet deep, nearly all of it reaches the surface in lumps. The solidity diminishes with the depth at which the extraction takes place. The price of lump coal, at the different mines, varies from 10 to 30 cash per picul, or from 13 to 40 cents per ton, and the country people pay even less than 10 cash. The anthracite of this region is of the same excellent description as that of Tse-chaufu; it has a large conchoidal fracture, great firmness, a perfectly clean surface and is very lustrous. The only noteworthy impurities consist in the thin earthy bands, which I have mentioned from other places.

As regards the manufacture of iron, Pingtingchau is inferior in importance to Tsechaufu. The districts of Pingting and Loping produce chiefly wrought iron; while in Yü-hien cast-iron pigs are principally made, which are recast into moulds at Pingtingchau. The processes applied in this region are the same which I have described when speaking of Tsechaufu, with this difference, that they are still more simple. Two or three plat-forms on loess, rising in terraces one above the other, and a few excavations in the soft walls of loess forming the sides of each platform—this is the whole establishment of an iron foundry, where not alone the ores are smelted, but castings and wrought-iron are both made. Two low walls, three feet high, fifteen feet long, and five feet apart, enclose the smelting place for a single layer of 300 crucibles. Top and front are open. On the fourth side is the wall of loess, in which a cave is dug for the bellows. A few of this sort of smelting places, a puddling furnace with a smoke-stalk consisting of a vertical pit in the loess, a cave for making crucibles, another for drying them, and a third to serve as lodgings and boarding room for a dozen or two of workmen, this is all that is required to make a foundry complete. On the highest platform the ores are smelted. The pigs are thrown down upon the second and third platforms; on one of which castings are made, while on the other the pig iron is converted into wrought iron. A capital of 30 dollars would be sufficient to start this complete set of foundry and iron works, including the purchase of a stock of coal, ore and fire-clay. These substances are all close at hand, and cost only a trifle. The iron ore is dug out and sold by the owners of fields which happen to be situated on ore-bearing strata. An open hole is sometimes sufficient to get the best iron ore; in other places pits are sunk to little depth. Various kinds of clay and moulding sand are got in a similar way. The iron is sold at 22 cash per cattie, its chief depots are Hwo-lu-hien and Shun-te-fu, which, in exchange, provide the mining country with grain. The works are so much scattered over the country, that I am unable to make any estimate as to the quantity of iron produced. It is large; and I give it only from hearsay, that it is inferior to that which is made in Tse-chau-fu.

The pottery of Ping-ting-chau deserves, too, a passing notice: it is chiefly a certain kind of very light and thin ware, with a graphitic lustre which is much valued by the Chinese, and is

largely exported to other portions of Shansi and Chili, a considerable quantity of it taking its way to Peking. The only place where it is made besides is Poshanhien in Shantung, whence that whole province is supplied. All this varied and valuable mineral produce is owing to the existence of the coal formation, which furnishes both the raw material and the fuel for its working. It is impossible to express in figures the extent of the coalfield of Pingting-chau. The present mines constitute a narrow and crooked belt, following the line along which the coal measures crop out, between the horizontal strata of the underlying limestone and the overlying postcarboniferous. From here the coal-bearing strata extend, between those two formations, to the west, southwest and north, nearly undisturbed for a great distance, in fact through almost the whole of southern Shansi. Adits miles in length could be driven within the body of the coal, underneath great thicknesses of superincumbent strata. It is probable that all or nearly all the anthracite beds would there be worth extracting. Mining is therefore capable of a practically almost unlimited extension.

These extraordinary conditions, for which I know of no parallel on the globe, will eventually give rise to some curious features in mining. It may be predicted that, if a railroad should ever be built from the plain to this region—and there is no other means of ever bringing to their due account its mineral resources—branches of it will be constructed within the body of one or other of these beds of anthracite, which are among the thickest and most valuable known anywhere, and continue for miles underneath the hills west of the present coal belt of Ping-ting-chau. Such a tunnel would allow of putting the produce of the various coal-beds immediately on railroad carts destined for distant places; it would, also, open out extensively the deposits of iron ore and clay.

9. *Hwo-lu-hien.* (獲鹿縣)

I have described, in the first paragraph on Shansi, the general features of the descent from Ping-ting-chau to the plain. The scenery among the cliffy limestone-hills is highly romantic. The rivers have eroded for themselves deep and narrow passages, through which the Chinese were unable to construct a practicable grading. The repeated ascents and descents which the road has to make, in order to avoid those places, renders it nearly unfit for traffic by carts; and it would puzzle an engineer to trace a convenient grading through this rocky defile. A branch of the great wall marks the boundary between Shansi and Chili. It is passed at the Ku-kwan gate, between two limestone cliffs, and is here substantial and in good repair. The limestone along the whole descent is bent into some large folds, in two or three of which remnants of the coal measures are left. The coal is in a crushed condition, no lump at all being procured, and is only used by the inhabitants of the vicinity on account of its low price. At Tsing-king-hien, 130 li east of Ping-ting-chau, a beautiful basin is reached, surrounded by a large circle of rugged hills. The surface in this basin consists of the soft strata of the coal formation, and work is done at several mines. But although their situation in reference to the plain is convenient, they will never be of any but local value, as the fuel is of an inferior description. It is a semi-bituminous coal, soft and crumbling. A considerable quantity is exported to the plain for blacksmith work.

At the eastern foot of the Silurian front range, which intervenes as a belt of serrated summits between the descent of the plateau and the plain, the city of Hwo-lu-hien is reached, 200 li east of Ping-ting-chau, and 660 li from Peking and Tientsin. The crowding of thousands of pack animals, mostly donkeys, in the last portion of the road, prepares the traveller beforehand for his arrival at a place of commercial importance. Hwo-lu is practically the terminus of the cart-roads from various portions of the plain; on the road westward to Shansi, carts are little used for the transportation of goods, nearly all freighting being done by pack animals. It is, however, not merely a transit place; the merchants of Hwo-lu are actual buyers of goods, and redistribute them. Hwo-lu is the chief place from which the province of Shansi is supplied, and exceeds Ching-wha in importance. For a commercial traveller, this would be the best adapted place for learning, within a short time, valuable details regarding the trade of Shansi; he would probably gather more information than by travelling through all the cities of that province. It is suprising that this has not yet been done by those interested in the commerce of Tientsin; as Hwo-lu is within easy reach from that place, and the supply of Shansi with foreign goods, on a larger scale than it takes place at present, should be among the chief objects connected with the Tientsin trade. I regret that I must confess to be incompetent for collecting just that kind of information which is needed from places such as Hwo-lu, because, to be of value, they require a detailed, and perfect acquaintance of the informant with the different articles of import, and certain features of trade current only to those who are themselves engaged in it. Besides, it is scarcely possible to gather correct information, on a passing visit in a busy trading place, chiefly when the curiosity of the people is so great as at Hwo-lu, and even signs of rudeness are not wanting.

Hwo-lu is the chief entrepot of coal, iron and pottery from the department of Ping-ting-chau, of the produce of the plain, and the imports from Tientsin destined for Shansi. The principal goods going west are raw cotton, cotton manufactures, salt, sugar, wheat flour, medicines, &c. I had here the first occasion, since leaving Hankow, to see foreign manufactures take a conspicuous part among the articles of import. From what I could learn, they were chiefly destined for the plain of Tai-yuen-fu, where I had noticed a considerable consumption of them before. Besides, they appear to be distributed, together with raw cotton, to the northern ports of Shansi, that is, to those regions where cotton is not planted, while southern Shansi is to all appearance a small customer. However, even at Hwo-lu the foreign imports occupy a very inconsiderable place, as compared with the large bulk forming the object of inland and local traffic.

10. *Eastern foot of the plateau of Shan-si, from Ching-ting-fu to Peking.*—

I had left the great plain for the high-lands of Shansi at Hwai-king-fu, and reached it again at Ching-ting-fu. The descent of the mountains along the whole line between these two places, which are about 1,200 li apart, appears to be steep and sharply defined. At Hwai-king-fu it is directed from southwest to northeast. It has a meridional direction between Chang-te-fu and Ching-ting-fu, and then resumes the southwest and northeast trend between that place and Peking. The descent of the plain to the east is very gradual, as is evident from the slow course of the rivers. Along the foot of the mountains there are remnants left of a belt of loess. Between Hwo-lu and Ching-ting-fu (60 li) the road is on this formation. A great deal of cotton is produced in this region, 40 out of every 100 mow being planted with it; the extent of its cultivation coincides probably with that of the loess, as is the case in many other instances. The region adjoining the road from Ching-ting-fu to Peking (600 li) is on an average of a low degree of fertility, because great portions of it are covered with sand deposited in times of flood, by the numerous rivers which descend from the western mountains. These regions presented now a desolate appearance, as the crops were a total failure, whereever the means of irrigation were wanting. From Ching-ting-fu to Ting-chau (120 li), loam, loess, sand, and fertile alluvial soil alternate, and this is the general character of the soil until Peking.

The road crosses two main rivers, the Pu-to-ho near Ching-ting, and the Hunho or San-kan-ho, which passes a few miles from Peking. Between these there are several small rivers, some of which are navigable; they empty into the Pu-to-ho, and through it into the Pei-ho at Tientsin. The Pu-to-ho is navigable to a short distance below Ching-ting-fu. All merchandize from Tientsin destined for Shansi, ascends the river to that place, and goes then on by carts to Hwo-lu. The next navigable river is the Kiu-ma-ho, passing through the large city of Tso-chau, where a considerable commerce appears to be done The third is the Liu-li-ho; by it the anthracite from Fang-shan-hien is conveyed to Tientsin. As I hastened from Ching-ting-fu to Peking, I followed the great road through the plain. My knowledge of the hills which border it immediately to the west, is therefore necessarily very limited; yet I have sufficient data to believe that they are poor in mineral products, in their whole length. I except of course the belt of coal hills before described, (see Honan § 9) which extends along the foot of the mountains in the department of Hwai-king-fu. The only other place, south of Ching-ting-fu, that appears to be worthy of a further examination, in regard to mineral produce, is the district of Tsz-chau, where coal is reported to occur. I am not acquainted with the character of the coal mined in that region, nor with its mode of occurrence. But if I am allowed to preconceive an opinion, on the strength of analogy, I do not believe that that region can excel in either respect, unless the coal is mined on the top of the first plateau, in the belt of anthracite mines.

Between Ching-ting fu and Peking, the front range is everywhere distinctly visible, rising immediately to summits of 2,000 feet and more above the plain. Its rugged outlines, and the nature of the rocks which are brought from it to places in the plain for building purposes, leave no doubt that it consists of the same silurian rocks of which it is composed near Hwo-lu, together with gneiss, syenite and porphyry. A wide depression appears to separate it in most places from the high mountainous region beyond, which is probably the descent of the plain of Shansi. At one place, at least, in this depression (situated 130 li northwest of Ting-chau) the coal measures reappear; seemingly a repetition of their mode of occurrence in the basin of Tsing-king-hien (see § 9). An impure semi-bituminous coal, which can be made use of in blacksmith furnaces, is brought from there to the plain; it is all small and dust coal, and sells at Ting-chau at 6 cash per cattie (Tls. 6 per ton). It is therefore probable that the original price at the mine is high, and the mode of occurrence disadvantageous.

Proceeding north, the next coal mines are those of Fang-shan-hien, 100 li west-south-west of Peking, which I intend to visit from this city. An anthracite of unusually high specific gravity is mined here. It is dull, very brittle, of short conchoidal fracture, and dark gray colour, blackening the fingers by handling. It differs in all these respects from the anthracite of Ping-ting-chau and Tse-chau-fu, which is to all appearance superior in quality. It sells at the mines at 130 cash per picul. Most of it is transported on camels to the mart of Liu-li-ho, a distance of 30 li, where its price is 200 cash. There it is put on boats and carried to Tientsin. The distance of that place is about 300 li by land and over 400 by water, freight is 300 cash per picul. The anthracite of Fang-shan should, accordingly, be laid down at Tientsin at Tls. 5 per picul.

Besides these two localities, distinguished by the occurrence of coal, no mineral products are known to me, from the mountains bordering the plain along the highroad; and those two are quite subordinate in importance, as compared with the grand coal and iron deposits of Shansi. This conclusion may appear rash, if it is considered that Fangshan is situated in the vicinity of Peking and Tientsin, while the chief mining districts of Shansi are remote from those two places and other important regions of supply. But it must be taken into consideration, that it is impossible to discuss the relative importance of the various mining countries in China, unless they are imagined to be connected with the regions of supply, and chiefly with a seaport, by better means of communication than those now existing—that is, by rail-roads. If Fangshan and Ping-ting-chau were connected, in this way, with Peking and Tientsin, and if we take, as a basis of calculation, the price of freight as established on German railways, then the cost of freight of anthracite from Ping-ting-chau to Tientsin or Peking, added to its original price would be Tls. 1.7.6; while the corresponding figures for Fangshan anthracite would be, Tls. 1.9.3 to Tientsin, and Tls. 1.5.4 to Peking. Leaving out of consideration all other advantages which are on the side of Ping-ting-chau coal, on account of its superior quality and its convenient situation in reference to large portions of the

plain, then its superiority as regards solidity would alone suffice to secure for it the monopoly of both markets. What is true in this respect of Fangshan, is applicable, on stronger grounds, to the various other coal localities in the vicinity of Peking and Tientsin.

RETROSPECT.

In taking a general review of the country between Hankow and Peking, along the route of my travels, three natural divisions may be distinguished; 1st, the valley of the Han river and its tributaries, including portions of Hupè and Honan; 2nd, northern Honan, between the Fu-niu-shan and the Tai-hang-shan; 3rd, the highlands of Shansi.

The valley of the Han river is an agricultural country of moderate fertility; and. though not distinguished by either variety or quantity of productions, yet produces enough, in favourable years, to export a considerable proportion of cotton, grain, hemp and other articles. It partakes in the facilities for extensive and cheap, though far from perfect, water-communication, proper to the central and south-eastern provinces of China; and can easily dispose of superabundance in good years, or supply its wants in time of drought.

Honan ranks among those provinces of China which are most favoured by nature. It is rich in both agricultural and mineral products. Coal, iron, and lead constitute the latter. Lead, which is the least in value, is exported west; iron is not manufactured at present, but the conditions for a renewed production of it continue to exist. The region of Lushan and Juchau yields a tolerably good bituminous coal, which is only consumed in the vicinity; while the region of the Tai-hang-shan produces a superior sort of anthracite, a small portion of which is exported to Chili. The agricultural produce is as varied as can be expected, in a latitude which does not allow the raising of crops of superior value, such as tea, sugar, &c. Wheat and grain in general, rank probably first in value; but, with the exception of some exports to Shansi, are consumed in the country, because the adjoining regions of Chili, Shantung, Shensi, and the Han valley are themselves largely productive. Cotton is grown extensively, and takes the first place among the articles of export. That from Juchau goes to the Han river, that from Honan-fu to Shansi, Shensi and Kansu. Opium is made nearly every where, mostly for home consumpt ion. The population is excessively large. The alluvial regions on the Hwangho are subjected to destructive floods; the loess regions to drought. Imports are supplied at nearly equal rates, from Hankow via Shĭ-ki-chin, from Ching-kiang by the mart of Chou-kia-kou, and from Tientsin by that of Tau-kou-chin. Intercommunication is not difficult, but slow and expensive, as there are no navigable rivers excepting a portion of the Hwangho. Insufficient crops are, therefore, productive of great suffering; while superabundance does not benefit the population in the same measure as would be the case if freight were easier and cheaper. The country serves, in a small measure, as a passage way from the east to Shensi, but is of vast prospective importance as the gate to Central Asia.

Shansi, finally, is throughout a mountainous country, and its chief products are mineral, viz., coal and iron. In proportion to its area, it has probably the largest and most easily workable coalfield of any region on the globe; and the manufacture of iron is capable of almost unlimited extension. Its own resources for supplying its population with food and clothing, which are mainly limited to the plain of Tai-yuen-fu and the valley of Ping-yang-fu, are far from sufficient, and a considerable importation is required. Hwo-lu-hien and Ching-wha-chin, both situated at the foot of the mountains of Shansi, are the chief places of supply; and serve, at the same time, as the chief depots for the mineral products of Shansi. Both places are dependent on Tientsin as regards imports by sea. Flour, grain, cotton, and manufactured goods are the chief articles which Shansi re ceives, in return for iron and coal. The means of intercomm unication are of the rudest and most expensive, and, though affording a living to a great number of hands, put imported breadstuffs nearly out of reach of the poor classes. The mountainous districts in particular are therefore subjected to famine and starvation.

I visited the three regions here spoken of, in a season which was exceedingly unfavourable for forming a just opinion in regard to the state of their general prosperity and wealth. In Honan and Shan-si the drought had been great for several years, and in this present year the first crops were almost a total failure, excepting on those very limited patches of ground which can be irrigated. The poverty of the people has therefore constantly kept increasing, and is now appalling in some districts. All kinds of food commanded an unusually high price. In Shansi, meat was a rare luxury, even pork was scarce, and salt fish, which usually serves as a substitute for meat, was only consumed by the wealthier classes. The second crops did, latterly, succeed better than the first ones. Millet is the staple of the second crops, and was now the chief article of food. A depression of all trade is the natural consequence of this poverty, and all imports other than breadstuffs diminish in quantity from year to year. This present year will undoubtedly be worse than the preceding ones. A single good wheat crop would change this state of things materially, but only a series of good crops would allow the country to return to its normal state.

On the causes of the backward state and growing decadence of the northern, as compared with the central and southern, provinces of China.

If we now consider the entire country described in this letter, together with all the regions north and northwest of it, in their normal state, that is, in that condition in which they are after a series of ordinary crops, we find that they contribute in a mere nominal degree to the exports from China to foreign countries; and, as the range of those productions, too, which they supply to the central and southern provinces of China is small, it is only a natural consequence, that they occupy a low position as consumers of foreign imports. These circumstances are partly due to the absence, in those provinces, of the staples of foreign exports. But this is not the sole cause. The traveller has occasion, at every step, to observe the contrast of the present poverty and inertness of the inhabitants, with the signs of a previously better condition. The large cities, even the villages,

the temples, the remnants of magnificent public structures, as well as the history of China, give evidence that the northern provinces have been in a more prosperous state. No more appropriate instance can be cited than the city of Peking itself, which abounds in the signs of former magnificence, and is now the theatre of growing ruin and decay. I will not here consider those internal causes of this change of conditions, which are connected with the forms of religion and government, but beg your indulgence for some concluding remarks, on those material causes which offer themselves to the constant observation of the traveller.

The first cause is the deterioration of the climate, which is probably the consequence of the extermination of the forests. Throughout the whole country, from Hankow to Peking, all mountain and hills are destitute of trees, and shrubs, and offer a most desolate aspect. The exceptions are the groves of trees at the villages and temples, and the range of the Fu-niu-shan, where many hillsides are planted with oak trees for feeding wild silkworms. There is no positive proof that it had formerly been otherwise. But it is exceedingly probable; and the people everywhere assert that their mountains were covered with trees, in old times. They are hardly aware of the natural connection between this tale and the saying of old people, that the rains decrease in frequency and increase in violence, from generation to generation. Besides this injurious effect of the devastation of the forests upon the climate in general, there is an immense amount of destruction incessantly going on, which would not take place if the hills were wooded. The heavy rains wash off the soil from the rocks; and the water, instead of penetrating into the earth, and being stored up for feeding springs, runs down the hillsides, and descends in torrents through gulches which before were perfectly dry. Where the river reaches the valley, the boulders are deposited, and fine sand is spread over the surface of fertile alluvial soil, rendering extensive regions unfit for agriculture. Instances of these destructions are numerous, in Shansi and on the borders of the great plain. If it were not for the loess, northern China would already be a desert, with some fertile valleys enclosed. Even this beneficial formation, which is the principal seat of agriculture, and more than other kinds of soil capable of storing up moisture, is undergoing a rapid destruction.

Another cause is the extremely bad state of the means of intercommunication. They have evidently never been in a good condition, yet were better than now in some former time, when Shansi and Honan were in a flourishing state. I have given, in the foregoing pages, some figures in regard to the prices of freight. They make patent the disadvantages under which the population labours, chiefly in regard to the cheap necessaries of life. I repeat, that coal, which costs in Shansi thirteen cents per ton at the mine, rises to four taels at a distance of 30 miles, and to over seven taels at a distance of 60 miles; also that, at Nan-yang-fu (Honan), coal from Hunan is used which has travelled eight hundred miles by water, and is sold at the same price with the coal mined at the distance of thirty miles from the city, but which is transported by land. Only those who live in close vicinity to coal mines can therefore derive benefit from them; while to others, who live at a day's walk, coal is a luxury for which they can no longer afford to pay. When the hills were wooded, this want was less felt; but the only fuel which is now used by the great majority of the population, consists in dried herbs and the last few remnants of rootlets of shrubs, which they dig up carefully from the ground. Similar considerations apply to the distribution of grain and other necessaries of life. It is painful to see how much animal power is wasted, on account of the imperfect construction of the roads. Five animals drag slowly a load of twenty piculs. This is the usual rate for the conveyance of goods. It is surprising to see what a large number of mules and horses are employed in the carrying trade, and how great a proportion of the agricultural land serves only the purpose of feeding these animals. As the service which is done by a horse in this region is probably, on an average, not more than one fifth of what it could be on well constructed roads, it may be said, that about four fifths of the area of fields retained for raising feed for cattle, is wantonly lost to the cultivation of other crops. This does not apply to the south, where only few horses are kept and grass is plentiful. The south can therefore sustain a comparatively larger population, if all other things are equal.

This consideration leads us to the third cause, which is the over-population of some of the northern provinces. It applies chiefly to Honan. The consequence is, that as much as possible of available ground must be retained for raising breadstuffs and clothing for the inhabitants themselves, and the produce which might be exported is restricted in quantity. If the soil is fertile, as in the department of Hwai-king-fu, the people are well fed and tolerably well clothed, but little money is gained to supply other wants. The cultivation of the fields requires only a limited number of hands; many are therefore unemployed, and the people in general become lazy and indifferent. The chief cause of the over-population is the early marriages. The increase of the population begins to bewilder the intelligent classes in Honan, and they have the desire to see the early marriages restricted.

It is scarcely possible, as yet, to estimate at its true value the effects of the use and growth of opium by the Chinese. It appears to me, that the inhabitants of the northern provinces, chiefly those of Shansi and Honan, are more addicted to its use than those of the south, for instance of Hunan. It may be, that the inactivity during winter, chiefly during the long evenings, causes the promulgation of the evil. It was asserted to me in several places in Shansi, that ninety per centum of the adult male population are given to that vice, and that it is not uncommon among women. It is equally found in cities and villages, and spreads even largely among the labouring classes, which are still free from it in the south and in Manchuria. The population of whole towns are disfigured by the haggard faces and staring eyes, consequent on the use of opium. Without taking here into account its moral effects, it must not be overlooked, from an economical point of view, that opium-smoking consumes a great deal of time, which would otherwise be devoted to labour, and weakens the system for the rest of the time actually employed in work. The aggregate amount of physical force and mechanical work, by which the population is impoverished every year, would sum up terribly, if it could be calculated. From the consequences of the use of opium, must be distinguished those which attend its growth. I did not ascertain, what proportion of arable ground is occupied by the cultivation of the poppy. Since its introduc-

tion, twelve years ago, the area planted with it has been constantly increasing. Unlike the southwestern provinces, where copious rains appear to allow the growth of the poppy in nearly every place that would be adapted to other crops, it is the best fields which are reserved for it in the north, chiefly the irrigable land; and its cultivation requires the same care as that of garden vegetables. If the same fields were applied to raising wheat, and the same extra labour to other purposes, the population would be better off. On the other hand, it must not be forgotten that this consideration applies to the Chinese Empire at large, but, if we descend into detail, is only true in those instances where the opium raised is consumed at home, as is the case in Honan and Shansi, while material benefits can accrue where it is exported, as is the case with Shensi and Kansu. As these provinces produce, besides medicine, no other article of export, and as the opium raised there commands a high price, its direct injurious effects upon the growers may be more than counterbalanced, by the material welfare consequent on the sale of the drug; and, though injuring one branch of foreign commerce, that sale may also be the best means to enable the inhabitants of Shensi and Kansu to buy other foreign imports. I have already said that Indian opium is consumed in very little quantity in the north-western province, although the native growth of the poppy is strictly prohibited by law. This prohibition is among the most prolific sources of income of the officials. Poppy is grown as openly and publicly as wheat; but, for every acre planted with it, the tacit connivance of the authorities has been secured by bribery, otherwise the law would be enforced.

The competition with foreign trade is another cause of the decadence of the wealth of the north western province. If we commence with the trifling article of needles, their manufacture in Shansi has been almost annihilated, by the importation of the much better and cheaper foreign article. The same will be true, before long, in regard to guns and steel ware; and there can be no doubt that the injurious effects of foreign competition have been seriously felt by the iron trade of Shansi in general. * Being the only noteworthy article of export from that province, the diminished sales and reduced prices contribute to impoverish the inhabitants. A similar competition has existed, and does exist, in the South, for instance in regard to cotton goods; but any reduction which the native trade may suffer, is there fully counterbalanced by the demand of the foreign merchant for tea and silk, and their increased pro duction. This commercial prosperity of the South, attending the relations with foreign countries, is another cause not only of the comparative but the absolute decadence of the north, inasmuch as the central and southern provinces have become independent of it, medicines and some cotton being nearly all they require of its products.

Finally, the devastations by rebellion must be reckoned among the causes which have materially affected the prosperity of the northern provinces; for, although they have actually not suffered more, and perhaps less, than the southern provinces, they do not recover as easily as those. An instance is afforded by the manufacture of iron in Lushanhien, which died with the troubles attending the accession of the present dynasty and did not revive afterwards. The easy means of locomotion in the south, allow a devastated province to be settled, in the course of time, from other over-populated regions. But, great as the attractions of the fertile province of Shensi may be to the Chinese, it will be a long time before the ravages made, first by the Nienfei, and at present by the Hwy-fei † on the number of the population, shall be restored, because the heavy and expensive means of filling the ranks by immigration will here hardly be had recourse to.

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* It is not possible to arrive at a correct estimate of the quantity of iron produced in Shansi. The chief region where it is manufactured is *Tse-chau-fu*. None is smelted from the ores in Lu-ngan-fu, which is wrongly considered as the main iron region of Shansi. I had this information when travelling through the country; and it has been confirmed to me, by a gentleman who travelled especially through the department of Lunganfu. But as Tsechau fu did formerly form part of that department, the name of Lu-ngan-fu iron, or *Lu-iron*, is still applied for that produced in Tsechaufu. A great quantity of pig iron, from the latter country, probably about one-half of all that is made, takes its way to Lu-ngan-fu, where it is converted into castings and wrought iron. This fact contributes to cause the mistake to continue to exist.—Second, in regard to quantity and quality, ranges the department of *Ping-ting-chau*, which produces the *Ping-iron*. I believe that, without danger of over-estima-tion, the quantity of iron made in the districts of Fungtaihien and Kaopinghien (Tsechaufu) can be put at 200 tons daily. If we add Yang-ching-hien (in Tsechaufu) with 50 tons, Ping-ting-chau with 150 tons, and Tai-yuen-hien with 50 tons per day, then we arrive at a yearly produce of the province of Shansi of about 160,000 tons of iron, which leave the province in the shape of cast iron and wrought iron. At 20 cash per cattie, the value of this article of export is over three million taels. The consumers have to pay about half a million taels for carrying this quantity of iron one hundred li (30 miles), from the place of manufacture in the direction towards them.

† Hwy-fei is the name given to the Mahome-dan rebels, as distinguished from the Hwy-hwy, which means Mahomedans in general. I will add, here, a few notes on the state of this rebellion, as it was during the time of my journey. In January and February, a large organized body of rebels was about 100 li west of Lan-chau-fu, the capital of Kansu. At the same time, the Imperialists were mostly farther west, some as far as Su-chau-fu. They were reported 100,000 strong in all, badly fed and paid, and unwilling to fight, the Imperial general chiefly trying to avoid battle. The rebels were said to be well armed, partly with European guns, and not afraid of death. In the beginning of May, some mandarins travelled from Szechuen on the great road, via Singan-fu to Peking. When I met them in Shansi, they reported organized rebel troops east of Lan-chau-fu, near the borders of Shensi. No battle had taken place. But they had themselves narrowly escaped disorganized bands, which infested the department of Fung-tsiang-fu, north of the road, burning vilages, killing and robbing the inhabitants. No rebels were east of Fung-tsiang-fu. These news were substantially confirmed by merchants from Shensi. On arrival at Peking, I learned that other roving hands did infest the north of Shensi, and advanced as far as the north-western corner of Shansi; they entered Mongolia near Kwei-hwa-chin (Kukuhoto), and were known at one time to be within 600 or 800 li from Urga, where great anxiety was felt. They have retreated on that whole line, but the caravan road from Kweihwachin to Uliassutai and Kobdo is not yet open. The Chinese mails for those places go by way of Kiachta and Siberia. Since General Li has been set against the Hwy-fei, the Chinese are confident that the rebellion will be crushed.

There are other disturbances in the country, consequent on the famine and drought. The most serious one was near Honan-fu, at the time when I passed through that region. The districts of Sung-hien and I-yang-hien, south of Ho-nan-fu were then considered unapproachable, as several hundred men had congregated into a band of robbers, and fortified themselves in the hills, whence they made raids into the country. The first attempt to capture them had failed, and a body of several thousand soldiers, commanded by the highest military officer of Honan, were on the way to attack them. It is not probable that they have had success, because the bravest Chinese soldiers dread attacking a naturally fortified place.

Means of improving the condition of the Northern Provinces.

After having thus examined into the causes of the decadence of the northern provinces, we may ask : can this course of retrogression be checked, and a movement in the direction of material progress be created in its place ? and have foreign nations a practical interest in promoting such a change ? The latter question must be emphatically affirmed, as the extension of foreign commerce to any region is dependent, in a great measure, upon the state of material prosperity of the people inhabiting it. As regards the first question, there are certain causes of the retrogression, such as those dependent upon the climate, which cannot be remedied ; others are connected with forms of religion and government, and are not within the scope of these communications ; but there are still others, to which there are effectual remedies. These are all comprehended in the one proposition—improvement of the means of intercommunication, so as to be up to the level of modern times. In the central and southern provinces, great improvements, and a considerable increase of trade, are possible without such measures, although they would be of incalculable value in accelerating and enhancing progress. But in the north, this is the cardinal point, upon which all others are dependent, and no other efficient remedy does exist for them.

If we take into view the provinces of Honan and Shansi, their connection by railway with some sea-ports would, in the first place, allow the exportation of their most valuable produce, namely the mineral, and render possible its distribution throughout a populous country. The domestic consumption of coal, in the neighbourhood of the mining districts, in the north of China, is extraordinary. Such a place resembles a beehive in activity, many thousands of men and animals being often engaged in removing the coal. As no fuel of value exists throughout the great plain, and coal is completely out of reach for, probably, at least ninety per centum of its area, every station of a railroad through it would become a similar centre of coal trade, to those of the now existing mining places which are situated in populous regions. There would, consequently, be a great ncrease in the profits at the mines, and in the number of workmen employed ; an unbounded extension of carrying trade and local traffic would take place ; an immense benefit be conferred on some of the most populous regions of China; and some seaports would be supplied with a fuel that is probably second to no other in value, at a tolerably cheap price, and in large quantity. No less considerable would be the increase, and the improvement, in the manufacture of iron ; as the market for it would, in consequence of low prices of freight, be extended far beyond its present limits ; and the use of iron become as general in the great plain as it is now in the regions adjacent to the iron districts It is probable that the cheap price of labour and material in Shansi, and the superior quality of the wrought iron made there, would render it possible to export certain descriptions of Shansi iron to other countries on the Pacific. An important article of distribution through the agricultural districts would be lime, which is extensively used in China for the purpose of manuring, but at present within reach of a limited portion only of the inhabitants of the great plain.

The wealth of Shansi and certain portions of Honan would, therefore, vastly increase, by the direct sale of their mineral produce ; and the inhabitants would become acquainted with wants which they did not know before. The prime condition of an increased importation of goods, from foreign countries, would therefore be given. But a still more powerful stimulus, to all commercial relations in general, would be created by the immediate application of iron and coal to industrial pursuits. It is very probable that the northern provinces will eventually be the manufacturing regions of China. In regard to all these moves in advance, I fully endorse the words which you use in your Report on the Upper Yangtse : " Though the Chinese are of themselves incapable of originating any such improvement, they are very ready to avail themselves of it, when provided for them. But the spirit of enterprise is all on the side of foreigners, and the onus of every forward movement in commerce must necessarily rest on them."

The consideration of the benefits which, by the introduction of such improvements, would be conferred upon a nation endowed with so much natural intellect and commercial spirit as the Chinese, is a vast subject for the statesman, national economist, and philanthropist. I will merely mention two of the most essential. If there exists any means of checking the use of opium in China, it is this, to give employment to the people ; and nothing will put a more effectual stop to rebellions, than to place those regions most infested by them within easy reach from the Capital.

As to the provinces of Shensi and Kansu, the benefits which would accrue to them, from an improvement of the means of intercommunication, would perhaps be even greater than those that would be enjoyed by Shansi and Honan. I am not yet prepared to speak with precision, in regard to those remote northwestern provinces, the conditions of which are almost unknown to us ; but hope to lay before you some material in respect to them, in the course of a few months.

I have the honour to be,

Dear Sir,

Yours very respectfully,

F. v. RICHTHOFEN.

Peking, June 1870.

ERRATA.

Page 5, line 45. For "Wei-ton-shan" read "Wei-tsu-shan."

Pages 6, 7, 11 and 15 where "Tan-kow" occurs read "Tau-kou."

Page 9, line 33. For "province" read "provinces."

Page 11. For "Sin-wu" read "Siu-wu."

Page 14, line 20. For "Fan-shan-hien" read "Fau-shan-hien."
Line 69. After "well" insert "as."

Page 16, line 8. For "Taipang" read "Taiyang."
Line 38. After "iron" insert "ore."
Line 64. Leave out the first "The" and insert "No."

No. IV.

Amherst College

LETTER

BY

from

BARON VON RICHTHOFEN

ON THE

PROVINCES OF

CHEKIANG AND NGANHWEI.

SHANGHAI:
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1871.

No. IV.

LETTER BY BARON VON RICHTHOFEN

ON THE

PROVINCES OF

CHEKIANG AND NGANHWEI.

CHINKIANG, July 25th, 1871.

I HAVE just arrived at this place, on my return from a journey through some portions of the provinces of Chekiang and Nganhwei, which has occupied six weeks during the months of June and July; and I beg to lay now before you some of the results of my observations. In undertaking this journey I had two objects in view. The first of them was, to determine more definitely than I had done before, the sequence of sedimentary formations which take part in the composition of the hilly regions south of the Lower Yangtse. I had frequently observed on previous occasions, that a general parallelism with a southwesterly and northeasterly trend prevails in those regions, and is exhibited in the course of mountain ranges and valleys, as well as in the line of strike of sedimentary strata. I expected that, in going a few hundred miles across this trend, or in a direction from southeast to northwest, I might get at valuable results, regarding not only the sequence of the sedimentary formations, but also the geological structure of extensive regions. The results have not disappointed my anticipations.

My second object was this, to establish positively, to what extent coal-bearing strata take part in the composition of the hills south of the Lower Yangtse, and to ascertain, if possible, their prospective economical value. You are well aware, how frequently of late years the supposed mineral wealth of some regions adjoining the Yangtse to the south has been discussed and eulogized. Although my anticipations in regard to it were low, the short water communication connecting some of those districts with Shanghai made me consider it a matter of importance to arrive at positive facts, so far as they might possibly be established. In order fully to attain my object, I shall still have to visit the hills between Chinkiang and Nanking, for which I intend to start in a few days.

The route of my journey was as follows:—

I went from Shanghai by steamer to *Ningpo*. Thence I proceeded by way of the well known Snowy Valley due south to the high range of the *Tien-tai-shan* in the department of *Tai chau*, then struck westward through very hilly regions to *Tung-yang-hien*, and descended the *Kin-hwa* branch of the *Tsien-tang* river to the city of *Tung-lu-hien*, thirty miles below *Yen-chau-fu*. My further journey, which was again by land, is marked by the places: *Fan-sui-hien*, *Yü-tsien-hien*, the temple of *Tien-mu-shan*, *Ning-kwo-hien*, *King-hien*, and *Wuhu*, whence I descended the Yangtse to *Chin-kiang*.

This journey was performed almost entirely on foot, and can hardly be made in any other way, as animals of burden, carts, or even wheelbarrows, are quite unknown luxuries in those regions, and travelling in chairs would be inconvenient in crossing the great number of steep mountain passes that lay in my route. I have had little recourse to boats, as this mode of travelling, though easy and convenient, is of all the least suited for obtaining geological and geographical knowledge. The rate of progress was slow, because the baggage bearers must be hired for the entire journey, and were often worn out by heat and fatigue. It varied from ten to twenty-five miles a day. The heat was sometimes oppressive, but I was never seriously detained by rain. The nights were calm and cool, which was a great advantage, because, in the absence of inns, I had to lead a sort of a camping life. Judging from this past season, it is my opinion that these hottest months can be employed by an exploring traveller or naturalist to greater advantage in these middle provinces than in those of the north. The heat is there at least as great, and progress is often seriously impeded by rain.

All along my route, the people (as many as there were) were civil and kindhearted, until I reached the trading marts in Nganhwei to which the boats of the Yangtze ascend. The rudeness so characteristic of the people in the trading places all along the great river, was here immediately perceptible.

Before entering upon the special subject of my journey, I beg your indulgence for some general geographical considerations which may contribute to the better understanding, not only of the nature of the two provinces which I visited now, but of one of the most attractive and, for foreign interests, most important portions of China, namely the aggregate whole

of the southeastern provinces. I believe this will have been my last visit to any of them. My former views regarding the country have been partly confirmed and partly modified by it; and imperfect though they still are, I shall have no further opportunity of improving them. I hope, therefore, it will not be without interest if I give now the outlines of some of the general results at which I arrived, although I run the risk of being compared to the worm which, in burrowing a hole through a book, would claim to get acquainted with its contents.

1. *The Nanshan, or Hilly Belt of the South-Eastern Provinces of China.*

The present maps of China, all of which are drawn upon those made by the Jesuits, are, notwithstanding an utter lack of detail, remarkably correct as regards the general course of the rivers and the position of the main cities; but they are exceedingly imperfect as far as the orography is concerned. On the Chinese maps, the marks for "mountains" are strewn over the hilly districts like dry leaves scattered by the wind, in perfect confusion, but also without any aim at a correct representation. The Jesuits, and after them Klaproth, Berghaus, and other distinguished foreign geographers, have attempted to mark in a conspicuous way what they supposed to be the main mountain chains. They have succeeded admirably in a few cases, but failed in many others, because starting on the wrong theory of making the highest ranges follow the lines of the water-sheds. It is for this reason, that even now the delineation of mountains on a foreign made map of China is nothing better than a labyrinth of conventional orographical drawing, to find the path through which wrong guidance is given by the arbitrary mountain ranges which are put in. As it is impossible to understand any country, whether for theoretical or practical purposes, without an approach at a knowledge of its topography,* it should be among the objects of every traveller in China, to contribute his share to a better understanding of it within the limits of his journey. It is my present purpose, to draw your attention upon a belt of ranges of hills which, in more than one respect, claims particular interest, and which is as yet little understood.

The hills which make up nearly the whole of the province of Chekiang and southern Nganhwei form, together with a few adjoining districts of Kiangsu, the north-easternmost portion of a very extensive mountainous country which, throughout its extent, possesses many peculiar features, and is distinct from other hilly regions adjoining it to the west and northwest. It comprises, besides the provinces named, the whole of Fokien, Kwang-tung and Kiangsi, and the southern and eastern portions of Kwangsi and Hunan. It has a general trend from S.W. by W. to N.E. by E., and is about one thousand miles long by four hundred in width. It is bounded southeast by the sea, southwest it terminates either in Kwangsi or in Tongkin; the northwesterly boundary follows nearly the line of the Yangtse from Tungting lake to Chinkiang, but cannot be well defined in Hunan and Kwangsi.

I believe there is not a hilly region of similar extent on the globe, where there do not exist either one or several main chains distinct by their elevation and continuity, to which the others are subordinate, or which does not, in the absence of that feature, present some extensive tablelands, or which is not at least interrupted by large plains, from which the hills protrude as the summits of submerged main ranges, the subordinate ones not coming to the surface at all. It is the chief peculiarity of our hilly belt in southeastern China, which comprehends an area of over 300,000 square miles, that it presents no one of these features. In no portion of it is there any tableland whatever, nor does any one mountain chain, conspicuous by altitude and continuity, occupy a predominant position in reference to the rest of them, nor are the hills interrupted by large plains, excepting where branches of adjoining plains encroach upon the continuity of the boundary line, as is the case at the lakes Poyang and Tungting. The whole region is made up of ranges of hills of moderate altitude, most of which are of little length, and cut up by a complicated net of water-courses which, when minutely laid down on a map, exhibit angular lines. Many among these are a succession of narrow defiles that leave scarcely room for the river itself, and gentle valleys which have mostly little bottomland, but in some instances attain a width of from five to twelve miles.

I have crossed the belt in two places, once in its southwestern portion, in Kwangtung and Hunan, and now in its northeastern portion, in Chekiang and Nganhwei, and have, besides, seen it in several other places. From my own observations, as well as from the gleanings I gathered from the reports of other travellers, it appears that the features here described are everywhere conspicuous. If the ridges and hills of any separate region within the belt are considered collectively, they will be found to attain nearly equal elevations. It is, for instance, a common feature throughout large districts, that the ridges have an elevation of from 1,500 to 2,500 feet, and the highest summits rise to about 3,000 feet. If such a region is overlooked from one of these summits, it presents the appearance of a highland with undulating surface cut up by water-courses in a manner which renders it difficult at first sight to discover any system or order. This appears to be another common feature of the entire belt. Its highest summits do probably not exceed 6,000 feet, and it appears that there are not many between 4,000 and 6,000 feet, while altitudes of from 3,000 to 4,000 feet are frequent, and those ranging between 1,500 and 3,000 feet are largely prevailing in the summit ranges and minor ridges.

This unexampled differentiation, in an orographical respect, of a vast area is illustrated by the existing nomenclature, which is almost useless for the geographer. Wherever there exist prominent mountain chains in China, the inhabitants have not failed to discover them, and they

* No better instance can be cited to illustrate the practical importance of the knowledge of the orography of a country, than a certain well-known railroad map of China published a few years ago on a magnificent scale. A net of utterly impossible railroad lines connects on that fine sheet the large cities of China among each other and with those of India. After its completion, the author has put in a number of large mountain ranges to suit his convenience, good care being taken that none of them should find a railroad in its way.

apply for them distinct and collective names, such as the "Tien-shan," the "Kwen-lun," the "Fu-niu-shan," the "Tai-hang-shan." But in these hills of the southeast there exist thousands of names for mountains only or very short ridges, while not one is applied for a continuous mountain range; at least, all my efforts to discover such names were in vain. If foreign maps of China are consulted, they are found to supply amply this want. A very large and conspicuous mountain chain, following the northern water-shed of the Canton-West-river, is there seen to pass through Kwei-chau, by the name of the "*Yün-ling*," and to continue eastward as the "*Nan-ling*," forming the water-shed between the basins of Hunan and Kiangsi to the north and those of Kwang-si and Kwangtung to the south; then it follows as the "*Ta-yü-ling*" the water-shed between the coast rivers and the Yangtse, and with some more changes of name, reaches the sea south of Ningpo. This chain, upon the supposed existence of which such eminent men as Carl Ritter and Humboldt have founded deep speculations, considering it as a remote outlier of the Himalaya, is the result of a combination of truth and fiction. As regards the names applied, that of "Nan-ling" is not in use with the Chinese, while those of "Yun-ling" and "Ta-yü-ling" are the names of mountain passes. If a Chinese scholar were to make an exploration of Europe and, on his return to his native country, apply in a learned geographical treatise the name of "Brenner Pass" for the whole range of the Alps, he would not commit as grave a mistake in nomenclature as European scholars have made, not only in this present case but in very numerous instances, in the nomenclature applied in the orography of China. In the present case, local names of mountain passes (the word "*ling*" is exclusively applied for these) have been chosen to designate fictitious mountain chains of great extent.

In the absence of any collective name for the entire mountainous belt of the southeastern provinces, we may apply for it, for convenience sake, the very general term of "*Nan-shan*" or "the southern mountains."

2. *Axial Range of the Nanshan.*

If we attempt to examine into the laws which govern the distribution of hills and valleys and the flow of the waters in the Nanshan, the correct delineation of all geographical detail on a map would be of some avail, but by no means sufficient, on account of the extreme subdivision of all geographical elements. Nor would the great river basins that have given rise to the mode in which the division into provinces has been carried out, give us any better clue, because, on examination, their formation can be proved to be an entirely secondary feature, and but slightly dependent upon the mode of distribution of the mountain ranges. It is only by the light of geology that it is possible to discover the structure of the Nanshan.

A minute investigation of the geological features of those portions of the Nanshan which have come under my observation shows that a general parallelism does prevail in all details, the trend being the same as that of the entire belt, namely from S.W. by W. to N.E. by E. One soon perceives that this parallelism is repeated in the strike of the elevations and depressions, while the courses of the rivers partake in it to a limited extent only, and thereby frequently obliterate it, so as to render it difficult of recognition without close examination. It is a peculiarity of these rivers, that nearly any one among them will follow a longitudinal depression for a short distance only, then, with a short turn, intersect one of the two enclosing ridges at nearly right angles to its trend, until it reaches the next parallel depression. After having flown here for some distance in broad alluvial soil, and calmed the impetuosity of its waters, the river leaves the depression and winds its way through a steep cut in another ridge. But the longitudinal depression, although left by the river, continues. An affluent to the former descends, within the depression, from a low pass, and beyond this another river flows down in an opposite direction. In this manner, most of the longitudinal depressions, although in reality long and continuous, are subdivided into several sections. In each of these, two rivers flow towards each other in opposite directions, either to feed another river on its short passage through a portion of the same depression, or to form jointly a river which from the place of confluence breaks immediately through one of the enclosing chains. It is therefore evident that the rivers, although apparently obliterating the parallelism, render it on the contrary more conspicuous when correctly understood, chiefly on account of the minute parallelism that often prevails in the course of the small tributaries.

The fact of the existence of this parallelism once established, it is easy to trace it not only in all details throughout the Nanshan, but also in the general features of its architecture. Long narrow belts, homogeneous in their geological structure and parallel to the general trend, are detected. In those portions which I visited, and probably throughout its extent, the Nanshan is made up of these parallel belts.

Without entering further into the details of this subject, I believe I may consider as established the existence of an *axial chain*, or rather of a narrow axial belt of chains, which follows approximately the middle line of the Nanshan, in a direction from S.W. by W. to N.E. by E., and to which all the other parallel belts are in some respects subordinate. It occupies an important position in the geography of China.*

I crossed the axial chain first in the steep gorges of the Canton North-river, between Shao-chau-fu in Kwangtung and the borders of Hunan. It is here very conspicuous by its elevation and continuity, but does not form the watershed, which is in lower hills north-west

* No one, heretofore, has understood the geological struction of the southeastern provinces of China so well as Mr. Raphael Pumpelly, although he did not visit any of them. The consummate skill with which he used the data respecting the occurrence of useful minerals, which he found scattered in native geographical works, for giving the outlines of the geology of China, is deserving of admiration. A portion of the axial chain of the Nanshan is correctly indicated on his geological map of China.

of it. It runs hence in a direction nearly northeast by east, leaves the Meiling and Tayüling passes, as well as the watershed between Kiangsi and Kwangtung, to the south, gives origin to the narrow defiles of the Kan-kiang, north of Kan-chau-fu, rises then to the high summit of the Wu-kung-shan, (south-east of Ki-ngan-fu, Kiangsi), and can be distinctly traced on Chinese maps across the eastern portion of Kiangsi, until where it forms the watershed between the northernmost affluents of the Min river of Fokien and the Kin river of Kiangsi. A short portion of the range is here known as the Wu-i-shan. It was first visited by Fortune, and afterwards by other travellers from the West, on journeys from Fuchau to Kiangsi and from Hangchow or Kiu-kiang to Fuchau. The range then continues as the southern watershed of the Tsientang river and its affluents, and once more achieves some prominence in the Tien-tai-shan. It terminates in the Chusan islands.

But it does not end here. It continues to Japan, through Kiushiu and the islands of the Inland Sea, to the gigantic snow-covered ranges northwest of the Fusiyama, in the provinces of Mino, Shinano and Kai, where it intervenes with mountain ranges having quite a different direction, and here it terminates effectually. On the following pages I will not take any further notice of this transmarine continuation, but treat only of the Chinese portion, excepting where I make especial mention of the Japanese portion.

South-west of the place near Shao-chau-fu in Kwangtung, where I first mentioned the range, it continues a long way. It is intersected by the Kwei river and the West river, above Wu-chau-fu, and then forms another high mountain range, to which, on the northwestern slope, the Pokiang or South branch of the Canton West river flows parallel from Nan-ning-fu to Sin-chau-fu.

The reasons why this extensive axial range is not marked on any maps are these, that it is not a continuous, conspicuous, and elevated summit range, and that it does not coincide with any important water-shed, excepting at the Wu-i-shan and a short distance east of it; and here it corresponds indeed with the great conventional, but fictitious water-shed range (Ta-yü-ling) of the European maps. Farther east, towards the Tien-tai-shan, it is interrupted by rivers, among which is the Tientai river itself, and to the west it is so frequently broken up by rivers flowing transversely to its course, that it can only with difficulty be recognized as an originally continuous chain; this is true of its course in Kiangsi and Kwang-tung. I do not think that the axial range comprises the highest summits of the Nanshan. The mode in which these are distributed, appears to be irregular, and, as it were, accidental. One or another of the belts of elevation rises quite suddenly to great altitude, forms one or two high summits, and then descends again to nearly the same level it had before. Such is the case with the three well-known summits of the Tien-mu-shan, the Ta-whang-shan, and the Lui-shan. But although the axial chain does probably not excel by the existence in it of the highest summits, it appears to exceed in average altitude all the other parallel belts of elevation.

Including its course in Japan, the axial range of the Nan-shan has an extent in length of over two thousand statute miles, and is among the longest mountain ranges of Asia. Its straight course, its similarity in composition in widely distant portions, and the extraordinary lateral development of its dependencies, in China, give it an additional claim to our attention. But while, in general, the prominent mountain ranges on the globe are well known to have been subjected to the action of elevatory forces and considerable changes in late geological ages, and owe their altitude mainly to events of comparatively recent date, and while the greater portion of the sedimentary rocks entering into their composition have, in most of them, undergone a considerable metamorphism, by which their mineral character is completely changed, the axial chain of the Nan-shan, so far as its Chinese portion is concerned, can on the contrary be proved not to have undergone, since immense periods, any changes of note by the action of elevatory forces, and its rocks to have been scarcely affected by metamorphosing agencies at all. The chief forces which have contributed to give the Nanshan its present shape were the denuding agencies. To these, the Nanshan, together with its lateral dependencies, were subjected uninterruptedly since probably as early an epoch as the Triassic.

The rocks that build up the axial chain in the Chinese portion consist of little altered sandstones, shists and limestones, probably of Silurian age, intersected by a profusion of granite and, in later periods, porphyries. The granite forms considerable portions of the broad chain by itself alone.

When I visited the Tien-tai-shan near Ningpo, I had just returned from a tour through Japan. The similarity in character between that chain of mountains to which the Tien-tai-shan belongs and the hills of Japan, chiefly in and around the Inland sea, is surprising, and struck even forcibly my illiterate companion. It is founded on a similarity of geological structure, and ceases as one leaves the central range. The resemblance is, of course, restricted to the scenery as made by Nature alone, and to the character of the vegetation. That remarkable charm which the work of man gives everywhere to scenery in Japan is never to be found in China.

A few particulars regarding the axial range may be worth mentioning, as they show the great influence which a long mountain range, even if so little prominent, exerts in a great many respects. In the first place, it nearly coincides with the main boundary of dialects. A Pekinese or Nankinese can make himself understood every where (with a few local exceptions in Kiangsi) to the north-west of the axial range, though the dialects of Shanghai and Ningpo may cause him some difficulty; but south-east of the range, the numerous dialects of Kwangtung, Fokien and southern Chekiang differ so widely from the mandarin dialect as to form different languages. The coincidence of a mountain range with a linguistic boundary is not surprising where the former is the water-shed; but it is a striking fact where a large and navigable river interrupts the course of the mountains, as is the case in Kwangsi. It is well-known that, in the whole of western Kwangsi, the spoken language differs little from the mandarin dialect.

Another point upon which I beg to draw your attention, is of a geological nature. It would take too much of my space to adduce the evidence, but I can state it as a result drawn from numerous observations, that since many geological periods eastern China has been undergoing an extremely slow and gradual subsidence, never interrupted by an upheaval of note. The subsidence may have been periodically almost at rest, and for some time have changed into a very slow rising, either general or local, but before this had produced any great effect, subsidence would again set in. The present geological period is one of those in which a slow rising of a portion of the land is interrupting the subsidence which, however, continues over the rest of the country. From Ningpo northward, there are evidences that the coast is rising, and the farther we go northward on the coast, the greater is the amount of rise which the land can be proved to have undergone. The Chusan islands, together with the adjoining coast, appear to have been stationary since long time, while at Hongkong there are evidences of a slow subsidence, and along the coast from Ningpo to Hongkong, the proofs of a gradual submergence seem to be numerous. It appears indeed, that the axial range, the Chinese portion of which terminates in the Chusan islands, forms a sort of pivot-line for the two motions that take place in an opposite sense on both sides of it. In consequence of this geological action, we see the great plains of Northern and Middle China extending southward to Ningpo, gradually diminishing in width as they approach that place, and terminating where the axial chain reaches the sea. A submarine plain continues southward, fringing the coast; and although the latter is a series of rocky inlets, most of them are made inaccessible by mudbanks. They allow the ingress to ships only in a few places, and are kept at a level with high water by growing in height in the same ratio in which the coast is subsiding. If this coast was rising, it would soon be fringed by a fertile plain, and it is easy to imagine to what enormous extent the Northern plains would be diminished in size if the emergence were changed into a gradual subsidence.

I venture to expect that the axial chain will prove to be of some importance to the student of natural history, chiefly as regards the geographical distribution of animals and plants. Its flora on and near the Tien-tai-shan differs from that of the hills near Hangchau; and the insect fauna offers striking differences in the same two regions.*

3. *Means of Inter-communication in the Nanshan.*

I am afraid I have already occupied more space than may appear justified, with a subject the bearings of which to practical questions may be considered as somewhat remote. Leaving off now any further geographical detail, it still remains for me to consider the Nan-shan from a few economical points of view. I must repeat, however, that all the conclusions at which I have arrived are merely the results of my limited experience.

If it is considered that the Nan-shan covers an area which is nearly equal to the aggregate area of France and Great Britain, and that its population exceeds that of the two Kingdoms by one-half, if the census of 1812 is accepted as correct, it is evident how important is the question, what are the natural facilities, and what the actual means for intercommunication? The Nan-shan offers in these respects the most extraordinary features. Denudation has been active so long time, and its effects have been so little counteracted by other forces, such as partial elevation, that it has smoothed away much of the unevenness of the surface. Many a water-course was formerly a chain of lakes that filled different sections of several adjoining longitudinal depressions and were connected with each other by narrow outlets through crevices in the dividing chains. All these lake basins, without exception, have been filled up long ago, by the detritus carried down by the rivers, and are converted into fertile valleys, and the connecting passages between them are levelled down to navigable streams. Many of these are full of rapids, but I do not know of any instance where cataracts impede navigation below the head waters. The absence of wagon roads, the scarcity in these regions of animals of burden, the cheap wages, and the little value of time, render it possible for the Chinese to apply boat navigation with pecuniary advantage where the difficulties, expenses, and risks would be found too great in Europe. They drag their boats over rapids which would there be considered an absolute obstacle to navigation, and across shallows where the water is only one or two inches deep and flows with great velocity over pebbly ground. It was a matter of surprise to the members of the embassies which formerly travelled through Kiangsi to the Meiling Pass, that the thirty million pounds of tea, which were then carried yearly across the Meiling Pass to Canton for the foreign market, had to go up a river the navigation of which would be considered an absurd enterprise in almost any other country. But there are hundreds of rivers, large and small, which offer similar and, many of them, greater difficulties than the Kankiang, and yet teem with life, or at least did so before the rebellion. And the amount of freight that astonished those early travellers is only a small fraction of the total which is transported every year up and down these water roads. Judging from my limited experience, I am quite prepared to find it stated, at some future day, as a result of ampler investigation, that all the rivers of the Nanshan, down to very small tributaries, are navigated to the neighbourhood of their head-waters, at least during those seasons when the water is swelled by rain. Conditions such as these are possible in a thoroughly mountainous region only when, geologically speaking, it has been during a long time in what we may call a state of rest.

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* The collector of objects of natural history will find the Tien-tai-shan and the Tien-mu-shan two admirable stations for his purposes. The former can be easily reached from Ningpo, the latter from Shanghai. At the Wha-fung-se monastery, which is built near the top of the Tien-tai-shan, at an altitude of about 2,500 feet, and at the Si-tien-mu monastery at the foot of the Tien-mu-shan, he will find comfortable quarters and a pleasant reception. The flora and fauna at these two stations are so rich and varied, and both places are so appropriate to serve as centres for excursions, that a stay of several weeks at each of them would amply repay the labours of the collector as well as of the student.

The benefits accruing to the country from these facilities for navigation can only be judged at their true value if the nature of the surface, as before described, is taken into consideration. The existence of a series of parallel ranges of elevation alternating with extensive depressions renders it evident that communication by land will be comparatively easy in a direction parallel to the axial range, if one follows the depressions, but difficult transversely to the general trend, when range after range must be crossed. The transportation of valuable produce from remote regions to seaports would, therefore, in many instances, not be worth the expense if it had to be done by land alone. You will now perceive the importance for the country of that peculiar feature of the rivers of the Nanshan mentioned above, namely, that no one of them follows a longitudinal depression for any long distance, nearly every river intersecting several of the ranges of elevation. The transportation of goods is therefore rendered easiest in that direction where, from the nature of the surface, it should be supposed to be most difficult and expensive. On the other hand, each larger river establishes communication with several of the depressions, and through nearly each of them is, by means of low passes within the depression, put into easy intercourse with the neighbouring basins. This is plainly illustrated by some of the great high-roads of commerce which make use of this advantage, as for instance those which connect Chekiang and Kiangsi, or Fokien and Hunan. Greater difficulties should be expected to obstruct the intercourse between Kwangtung and the provinces lying to the north, as not only the belt of axial ranges, but also one of the principal water-sheds must be crossed over. But here the circumstance comes into account, that the axial belt runs obliquely across the water-shed. For the two great high-roads from Canton to the north, across the Meiling to Kiangsi and across the C ê-ling to Hunan, such places have been selected where the main axial range is intersected by a navigable river. It is a strange coincidence, that either one of these long and narrow gorges, that of the Kan-kiang in Kiangsi, and that of the Canton North-river in Kwang tung, bears the local name "Shi-patan" or "the eighteen rapids." The two celebrated passes on the water shed are situated in either case on one of the lower ranges which intervene between the higher ones.

Apart from the rivers, all communication throughout the whole extent of the Nanshan is on foot. There exist no other roads but narrow footpaths, paved in many places with slabs of rock or cobblestones. All goods (with a few local exceptions, where pack-horses are employed) are carried by coolies, the usual contract rate for large amounts of freight being six *cash* a picul for each *li*, or just half a dollar for 100 *li* or 35 statute miles.

Among the consequences resulting from this system of intercommunication is a clannish subdivision of the population, which is, besides, accompanied in most instances by dialectic peculiarities. The people in any separate river basin, or in the basin of any separate affluent to a larger river, live in a state of happy seclusion and self-sufficiency. With the exception of those places through which a transit route of commerce goes, people know, besides their own valley, nothing but the river below to its outlet; beyond that is situated the rest of the world, which furnishes them salt and sugar, and the capital of the Hwang-ti. But beyond the water-shed they imagine a wild region inhabited by robbers and tigers, and the names of the next cities in adjoining basins are to them like those of a fairy tale. Priests and beggars are those who, in consequence of their wandering habits, exhibit generally the best geographical knowledge. It was sometimes only by means of people from these classes that I was at all able to move on my refractory coolies, who, in passing from one river basin to another, often imagined that they were to be carried directly into the claws of savages and wild beasts. This spirit of seclusion applies more particularly to those valleys which are drained by coast rivers into the sea, than to the basins of the affluents of the Yangtse, the inhabitants of which have a better opportunity to improve their knowledge, at least as regards a portion of China.

I may mention at this place, that throughout the Nan-shan, as far as I know it, the Spanish dollar is the only current medium of exchange beyond the copper *cash*, and that the range of its exclusive use appears to be co-extensive with the Nanshan. It is difficult to change a piece of sycee, and Mexican dollars are not taken at all, excepting in the immediate vicinity of Ningpo, Shanghai, and the Yangtse ports. If my generalization is correct, then we arrive at the surprising result, that that area of China in which the Spanish dollar has taken a firm and exclusive foothold exceeds in extent considerably the mother country of that coin. In the interior of all the other provinces, outside of the Nanshan, foreign coin is perfectly useless, sycee being the only current medium.

4. *Productive Power of the Nanshan.*

Those southeastern provinces of China which together constitute the Nanshan can vie with any country of equal extent in regard to the value of the products derived from the cultivation of the soil. They furnish all the exports from China to foreign countries, less a very small fraction. All the opened ports from which Chinese produce is exported in any noteworthy extent—viz., Hankau, Kiukiang, Shanghai, Ningpo, Fuchau, Amoy, Canton, are situated at the confines of the Nanshan, and receive their supplies from its navigable rivers. Besides what is needed for the foreign market, it provides the northern provinces of China with some of the most valuable articles, such as sugar, tea, silk, tobacco, hemp, rice, and many others. The west only, in particular the province of Szechuen, is independent of it, as it produces the same articles for its own use, besides opium, which is not cultivated in the Nanshan, if I am correctly informed.

Chief among the products is tea. All those regions which send their tea to the foreign market are situated in the Nanshan, with one or two insignificant exceptions, and tea can be said to grow well throughout the whole of that hilly country. The axial belt of ranges comprises itself some of the most valuable tea producing districts, as, for instance, the Bohéa mountains; and from the Tient-tai-shan in Chekiang to the province of Kwangtung, tea

appears to be largely grown on this elevated belt. Northwest of it are situated the green tea districts of Chekiang, southern Nganwhei, and eastern Kiangsi, while further on are the black tea districts of western Kiangsi, northern Hunan, and southern Hupé. There are no apparent reasons why tea should not be grown in western Hunan, western Kwangsi, and Kweichau, but nothing is known of its successful cultivation in those regions, and the tea of Szechuen even has not found its way to the foreign market, nor does it appear to be consumed by the Chinese outside of the province itself.

The amount of tea produced in the Nanshan is beyond computation, as the consumption by the Chinese cannot be estimated. Enormous as it undoubtedly is, it should not be overrated. The use of tea among the three or four hundred millions of Chinese is by no means so common as is usually supposed. The people of the lower classes in Shansi, Honan, Shantung, and other northern provinces know of it only as of a luxury, and sip hot water with the same, delight as the Moyune men their infusion of green tea, satisfied with giving it the name of "tea." The middle classes in the same provinces use an infusion of dried leaves of some indigenous plants, and the wealthier classes only indulge in the luxury of drinking genuine tea. Even in the tea-producing provinces the use of the beverage is not general. The shrub is grown on the hills, in many instances at altitudes not less than one thousand feet above the adjoining valleys. The inhabitants of these must therefore buy the tea from the growers. The poorer classes prefer to save the few copper *cash*, and use hot water, or, what is more common, an infusion of the leaves of other plants growing wild in their fields, such as for instance certain species of Artemisia and Ribes. These facts strongly suggest the idea, that the use of tea in China originated in the aversion the Chinese have to drinking cold water, which, in its turn, may have its natural cause in the fact, that in nine cases out of ten they have no other water to drink than such as has been flowing over rice-fields, and is rendered unhealthy by the quantity of putrid organic matter it has taken up. To drink boiled water and to improve it by scenting it with a few sun-dried leaves is, therefore, probably a very old practice, until finally, among the various leaves used those of the tea-plant were found superior to others, and the physiological effect of their infusion created new physical wants not originally associated with the use of either cold or hot water.

The conditions for the successful growth of the tea-plant are not yet well understood; but it must appear to a casual observer that its cultivation throughout the regions of the Nanshan is capable of an almost boundless increase.

The same remark applies to the cultivation of the mulberry tree and the rearing of the silkworm. The bulk of the silk which is exported from China comes from the valleys and plains situated between the extreme northeastern outliers of the Nanshan, in Kiangsu and Chekiang. I understand that the means for extending this important branch of industry are just now receiving particular attention at the hands of some high Chinese functionaries. The production of silk could probably be considerably enhanced, both in China and Japan, if the inhabitants of the two countries could interchange their experiences. It is a fact worthy of note that, notwithstanding an apparent similarity of climate, the conditions under which the mulberry tree is planted in either country are quite different. In China, it is grown exclusively on alluvial soil, while in Japan it is not at all cultivated on that sort of soil, but altogether on elevated ground, chiefly on certain terraces made up, in the main, of layers of pebbles, into which the present rivers are cut, sometimes to the depth of several hundred feet. They are very extensive in those places where large rivers leave the mountains and enter the plain. The foot of the hills is then separated by a broad terrace from the alluvial soil of the valley. Following any one of those rivers towards its source, we find it accompanied on either side by a strip of elevated ground, varying in width, and which is the continuation of the terrace below. On all this terrace ground the mulberry tree is cultivated in Japan, from an altitude of 200 or 300, up to that of 400 and 500, feet above the level of the sea. I did not see the mulberry tree planted in China at elevations exceeding a few hundred feet above the sea, and then only on bottom land.

I will not mention the details as regards the other produce of the Nanshan derived from the cultivation of the soil, as all the rest, though of paramount importance to the natives, is of trifling interest as regards foreign commerce. It would make up a long list if its great variety were to be exhausted. Of all the grain, vegetables, pulse, textile fabrics, and fruit trees peculiar to sub-tropical and temperate climates, few would be entirely wanting in the list, and these would be more than replaced by other kinds, peculiar partly to the Nanshan, and partly to eastern Asia in general. The staple of the valleys and irrigable portions of the hillsides is rice. Some provinces produce a superabundance of it, others must make up a deficiency by importation. If the balance could be made up, it would probably be largely in favour of the Nanshan, as it sends considerable quantities of rice to the northern provinces. On the rice grounds and level tracts in general, are planted, besides: sugar, chiefly in Kwangtung; tobacco, the most reputed of which grows in Fokien; several sorts of hemp, both of *Cannabis* and *Boehmeria;* several plants which produce oil, chiefly the ground nut and sesamum; others from which indigo is made; a variety of pulse, among which is the soya-bean; a number of plants with farinaceous bulbs; wheat and other sorts of grain. Cotton, although largely grown in the Nanshan, is nowhere planted in sufficient quantity, and large amounts both of raw cotton and of cotton fabrics, are imported from those great cotton-producing districts in Chekiang, Kiangsu, Nganhwei, Hupé and northern Hunan, which are situated along the northeastern and northern confines of the Nanshan, and branches of which spread far in between the ranges of hills composing it.

As regards the trees planted on alluvial ground, I need only refer to the great variety of fruit which the southern ports are sending to those of the north, a trade which promises

to assume gigantic proportions. The tallow tree, which is planted on level ground, is generally distributed in the Nanshan, but grows most plentifully in Chekiang. The varnish tree is almost exclusively met with in the groves of trees which adorn the villages. It is cultivated only in the northern portion of the Nanshan.

Of hillsides not fitted for irrigation a very limited use is made. I believe that not more than one-thirtieth of their area is under cultivation. Yet the enormous crop of tea is derived from that small proportion of ground. Besides the tung oil tree, the tea oil shrub and the camphor tree are cultivated and yield valuable produce. Of grain there are only to be mentioned *kaoliang* and maize; the sweet potatoe is cultivated up to considerable altitude.

The rest of the hillsides, excepting a few plantations of pine and bamboo, is a wilderness. This term must indeed be applied to at least two-thirds of the area of the Nanshan, but probably to a larger proportion. It is to this circumstance chiefly, that is owing the great beauty of scenery in the southeastern provinces. The hills are clad in verdure from top to bottom, and nowhere in temperate climates, with the exception of Japan, is there such a superabundance of beautiful flowers, such a luxurious variety of foliage, and such a number of plants emitting delicious fragrance either from leaves or from flowers. There is probably not a spot left in the whole extent of the Nanshan where nature is not stunted more or less by the cutting down the large trees. But wherever groves of these are left—and they are quite extensive in places distant from navigation—and vegetation has been allowed to develope unimpeded for a number of years, there is an intense beauty of scenery.

There is a free communism in China as regards the use of uncultivated hill sides. They are, as people express it, the property of the Hwang-ti, who allows the inhabitants to make unrestricted use of them. The consequence is a destruction of whatever is valuable. In the few places where large trees do still exist, they are being rapidly cut down; that portion of a tree which is required for building or for rafting down a stream is then taken away, and the rest left to decay. A certain possessory right is granted to every man who undertakes to cultivate any portion of a hillside. But the knowledge of forest culture is still in a very low stage, and no success would be obtained if nature was not so prolific. The plantations of pine trees are allowed to grow from ten to fifteen years, then they are cut down and the ground is replanted.

The produce from the animal kingdom, if silk is excepted, is almost *nil* in the Nanshan. Buffaloes, common cattle, and pigs, are the only quadrupeds reared generally through the country. Wild animals are very scarce, with the exception of the wild boar in the regions devastated by the rebels.

If we now consider the vast area of the Nanshan in regard to its *mineral resources*, the most striking feature is the complete absence (so far as my knowledge extends) of any mining for metals other than iron. The Chinese know how to find metalliferous deposits, and they mine them in those cases when profits are conspicuous. We must, therefore, conclude, that valuable deposits of copper, lead, silver or gold do not exist in the Nanshan, at least not within easy reach. This is a surprising result, if it is considered that there scarcely exists any other area of mountainous country equally extensive with this, which, if at all explored, has not exhibited a number of metalliferous deposits of some kind or other. There are two other considerations that must render our negative result a matter of disappointment. In the first place, there is a good deal of evidence which makes it probable that most or all of the exceedingly valuable deposits of copper ore of Japan, as well as those of several other metals, occur in sand stones of the same age with those taking part in the structure, not only of the axial range, but largely in that of many of the lateral ranges of the Nanshan. In the second place, some of those conditions with which the occurrence of metalliferous deposits is usually associated, namely the copious instersection of sedimentary rocks by eruptive masses of granitic, dioritic and porphyric rocks, exist largely in the southeastern provinces of China, and in a degree not surpassed in Japan. *Iron ores* will probably be found to be largely distributed. I know of two regions only where the Chinese smelt them. The centre of one of them is the city of Wanchau-fu in Chekiang, the other is situated in southern Hunan. The first of these localities, including a belt that reaches from Ningpo far into Fokien, gives little promise for the future. The ores consist of fine grains of haematite washed out from the sands of rivers. This mineral, at the original place of its occurrence, covers the walls of small crevices in porphyric tufas, which are largely distributed in that region, and is by their decomposition carried into the rivers. The establishment of a large iron industry is out of the question where the mode of occurrence is not more favourable. In southern Hunan, there is at least one deposit of considerable value. In the following pages, I will have to mention a few localities in Nganhwei and Kiangsu where iron ore occurs, and a great many more remain probably to be discovered, as the Chinese pay attention to certain kinds of iron ore only, which they can easily smelt.

The question of the range of distribution and the mode of occurrence of *Coal*, in the Nanshan, is too complicated a subject to be treated in a few lines. Some words concerning this interesting matter may, however, not be out of place. If we first pass in review the coal mines that are being actually worked at the present time within the area of the Nanshan, we find that those among them which are known to be of considerable value are situated in the great coal-field of southern Hunan, and in a recess of the hills east of Poyang lake. Besides these, there are a few localities, in every one of the provinces into which the area of the Nanshan is divided politically, where small coal mines of inferior value are being worked, and a number of other places where mining has been done in former time, but, from some cause or other, has been discontinued. If all these places were marked on a map, they would appear to be scattered without order throughout the area of the Nanshan, and it might be inferred that the coal-measures of these regions, or the various coalbearing formations occurring in them, as the case

may be, are spread extensively over the whole of the southeastern provinces. This conclusion needs, however, considerable modification. We find, on closer examination, that certain laws, quite plain in their general features, prevail in the distribution of the coal-measures. Starting again from the axial range, it is composed of the rocks of ancient formations, containing no coal. The broad lateral belts extending on both sides of it are made up, geologically, of parallel bands, consisting of the same ancient formations, and alternating with others composed of sedimentary rocks of more recent origin. Among these are the various coalbearing strata. Those bands which are composed of the ancient series of rocks, can very properly be said to constitute the skeleton or framework of the Nanshan. They comprise, as a rule, to which there are however exceptions, the highestranges of the Nanshan,and contain no coal at all. In the northwestern lateral belt there are only two of these bands; the southeastern consists of a greater number. There, the primary bands are broad and far apart, here they are situated much closer to each other; besides, they are on the southeastern side more rugged in appearance, contain more granite as a constituent rock, and rise probably, on an average, to greater altitude than the northern bands.

The extent to which valuable deposits of coal are likely to occur in the intervals between the solid parallel bars, as it were, of the framework of the Nanshan, will depend chiefly upon two circumstances. The first of them is, the mode of development of the coalmeasures. There may be only one coalbed, or there may be several; these may be very thin, or of considerable thickness; they may be close together in the sequence of enclosing strata, or widely apart. The second circumstance is, the degree in which the coal-measures partake in the structure of the surface. They may be washed away and the subjacent strata be exposed, or they may be covered by great thicknesses of superincumbent rocks. It is not so much on the latter as on the first ground, that we are justified in arriving at an unfavourable opinion as regards the occurrence of coal throughout nearly the whole area of the Nanshan. Although the strata of which the coal formation is made up vary in character as we proceed from south to north or from east to west, still its development is nowhere favourable, until we reach southern Hunan, where it extends over a large area, and, although reaching to no great altitude, spreads over the ancient rocks. The great extent of the basin, at the time when sedimentary deposition took place in it, as well as, probably, the vicinity, to the west, of terra firma from which large rivers emptied into the basin, may be among the causes which created here the conditions required for the formation of widely spread and valuable beds of coal. The other of the two valuable coal regions, the small district of Loping, east of Poyang lake, appears to be an isolated instance of the deposition of coal in a favourable place having taken place at a later epoch.

I will not enter now any further into the detail of this complicated question. Suffice it for the present to say, that, with the exception of southern Hunan and perhaps a few of the, as yet, little explored basins in Kwangtung and Kwangsi, the coal formation is unfavourably developed in the Nanshan, until its northwestern limit is reached, where, in the regions adjoining the Yangtse, from Yo-chau to Chinkiang, it shows a slight improvement. But we must proceed to regions farther north, and commencing at the southern boundary of Shantung, to find the coal formation developed to such an extent and under so superior stratigraphical conditions, as to render it probable that China is, if not the first in rank, at least not secondary to any other coal-producing country in the world, as regards the extent of its workable coal-bearing ground.

5. *The Tsientang River.*

This river empties into the sea near Hang-chau. It drains one-third of the province of Chekiang, and is a highroad of some importance for inland traffic. Its two chief branches are the *Tsien-tang-kiang* proper and the *Shun-ngan-kiang*. They unite at Yen-chau-fu. The former has a length of watercourse, from the source to Hangchau, of 320, the other of 310 miles, approximately. Yet the distance of the farthest points of the basin from Hangchau is only about 150 miles, the total area of the basin about 14,900 square miles (statute), over 2,000 of which belong to Nganhwei.

The southern main branch, or Tsien-tang-kiang proper, originates by the confluence of the *Tsing-ho* or *Küchau* branch and the *Sang-ho* or *Kin-hwa* branch. These twin rivers, both of which are navigable, illustrate the peculiar character of many of the rivers of the Nanshan as above described. Situated in one of the most distinct longitudinal depressions, they flow towards each other in nearly opposite directions, until they meet at Lanki-hien. Here they unite and form the Tsientang river. This takes at once its course directly towards the northern one of the enclosing chains, and intersects it in a narrow passage. The broad alluvial valley of the twin rivers is about 140 miles in length, extending along the northern foot of the axial chain, and nearly parallel to it. This great depression is among the main features in the geography of Chekiang. It may be called the *valley of Lanki*, as this walled city occupies a nearly central position. Eastward of the latter, the depression bifurcates, one branch extending over a low pass into the adjoining basin of Pu-kiang-hien and Chu-ki-hien, and affording easy communication by land with Ningpo. To the west, too, there is an easy passage from the basin of Lan-ki into the province of Kiangsi, well known as an ancient highroad of commerce, from the descriptions given by Staunton and other early travellers. If ever a railroad were required to connect Ningpo with the centres of Kiangsi and Hunan, the depression, so far as I have described it, would certainly allow of its easy construction from Ningpo to Kiangsi, and, so far as I am acquainted with the eastern passages of Hunan, the prolongation of a railroad into that province would probably not meet with any serious difficulty.

The bottomland, in the valley of Lanki, is from five to fifteen miles wide. It is bounded north and south by high and broad mountain ranges. Communication southward is therefore difficult; but to the north it is rendered easy by the river breaking through the mountain barrier. The narrow defile is cut into nearly horizontal strata of porphyric tufa of considerable thickness, and, finally, into hard porphyry. The length of the gorge is seventy miles. In one place the hills to the left recede from the river. Here, the Tsientang is joined by its great affluent, the Shun-ngan-kiang. The departmental city of Yen-chau, which is built at this place, is of no commercial importance. Twenty-five miles below it, at the Dragon gate (Lung-men-kou), the river emerges from the rocky narrows, and enters another longitudinal depression filled with alluvial soil, which it follows to Hangchau. Here the river widens. It continues through the coast plain, and reaches the sea fifteen miles below Hangchau.

The Shun-ngan-kiang has its head waters in the green tea districts of south-western Nganhwei. On a former occasion, I descended it by boat from near its source to Hangchau. Its tortuous course is instructive, if put down on a map in detail. It exhibits, in a conspicuous way, the system of alternate and parallel ridges and depressions. The river breaks through each one of the former in a steep gorge, which shows well the stratification of the sandstones, shists, and limestone, of which the hills are made up. After every such passage, it takes a longitudinal course, and flows a few miles through alluvial soil, bounded on either side by gentle slopes, until it finds a narrow passage through the next following ridge.

The three chief branches of the Tsien-tang river are navigable from their mouth to the vicinity of their sources, and they have many navigable tributaries. Of the twenty-nine departmental and district cities scattered through the basin, I do not know of one that cannot be reached by navigation in the season of high water. When the rains are scarce, cargo-boats can no longer proceed up-stream to many of the extremities of the water net. Shallows and rapids—some of them quite dangerous—are frequent at all seasons. The last of them, in descending the river, is just below Yenchau-fu. In its lower course, from Lung-men-kou to Hangchau, the Tsientang is a fine stream, well adapted for navigation by small steamers. But it is well known that the shoals at its mouth, and the rapid tidal currents, are a serious obstruction to the entrance of steamers from the sea. The Tsientang river will, therefore, never serve any other purposes but boat traffic.

The centres of trade, towards which this traffic is directed, are Ningpo and Hangchau. To them all goods coming down the river are destined. But neither of these places is in direct communication by water with the Tsientang. Cargo for Ningpo enters a canal which branches off from the right bank of the river, ten miles above Hangchow. Only a mile and a half up this canal is situated the mart of *Ni-chau*, which is the end of navigation for the Tsientang boats. Here the goods are carried a very short distance, by land, to another canal, the water of which is not at a level with the Tsientang, but communicates directly with Ningpo. This Nichau route (which is not marked on any map) is of importance, as nearly all the tea exported from Ningpo comes down that way. As regards Hangchau, the opinion appears to be current that, if only a certain custom-house could be avoided, goods, and especially teas, might be shipped directly from the Tsientang, via Hangchau, to Shanghai, without transhipment. This is erroneous, as no one of the canals, south of the Taihu lake, does in any place communicate directly with the sea or the Tsientang river. Goods destined for Shanghai must, therefore, be transhipped at Hangchau, and carried by land from the bank of the river to the head of the canal, a distance of two or three miles.

Although the Tsientang river mediates a comparatively easy and cheap inter-communication throughout an area of 15,000 square miles, it is at present little used as a highroad of transit. It has had this function in former time, when there were two great routes of traffic from Canton to Peking by way of the Meiling Pass. One of them followed the Kan-kiang to the Poyang lake, and then descended the Yangtse to the entrance of the Grand Canal at Chinkiang. The other left the Kan river at Nan-chang-fu, and thence ascended the Kiukiang to Yüshan-hien. From this place there were twenty-four miles of land travel, by a convenient route, across a low pass, to Kiang-shan hien, a city on the Kü-chau branch of the Tsientang-kiang. After following this river to Hang-chau, the road took the Grand Canal to Chinkiang and Tientsin. By chosing this route, the dangers and discomforts of navigation on the Poyang lake and the Yangtse were avoided. It was therefore chiefly used in going southward, and is said to have been indeed a common way for travelling between north and south, but it served also to some extent for the transportation of goods. The abandonment of this thoroughfare is one of the many changes in intercommunication which steam navigation is causing, slowly and imperceptibly, but irresistibly. If Lord Macartney could now repeat his journey on the Tsientang-kiang, he would be struck by the quiet aspect of the river, the banks of which redounded daily from fireworks and guns fired in his honour, when he was ascending the Küchau branch, on his way from Peking to Canton.

The valley of Lanki, although a beautiful and fertile country, with many a hundred square miles of alluvial soil, is at present of little commercial importance, because it has not yet recovered from the devastation it suffered from the Taipings. The cities and villages are demolished, the inhabitants decimated. Large tracts of ground are uncultivated. Yet, a considerable population is left. At Kin-hwa-fu, a beautiful arched stone bridge and a fine city wall, built of large square blocks of red sandstone, are monuments of a better time. A few streets only in the city have been rebuilt; they are merely lines of shops where the necessaries of life are sold. Lanki-hien is the commercial centre of the valley, and a tolerably busy place. The articles of commerce are, however, few and of little value. The imports are chiefly: salt, sugar, fish, and cotton; the exports: tea, paper, vegetable tallow, some tung-oil, and a few small articles. Pottery, lime, and building material are the rest of the bulky articles of boat traffic.

I omitted, however, the hams of Tung-yang-hien, which enjoy a Westphalian fame with Chinese gourmands, and are a considerable article of export to the remotest portions of the Empire. The consumption of foreign goods is small, a great deal of the clothing being provided for by importing raw cotton. Opium is little used by the country people; but those living in cities are considerably addicted to it.

The *Shun-ngan-kiang* is of much more importance for foreign commerce than the Tsientang-kiang proper. Its lower course is through a region which is sparsely inhabited. But on its head waters, in Nganwhei, are situated some populous cities belonging to the department of Hwui-chau, that have suffered comparatively little by the rebellion. I visited this charming country in October 1869; but it was known before, from Mr. Fortune's travels, as one of the main districts where green teas are made. It supplies largely the foreign market.

The chief place of the tea trade is *Tun-chi*, a small but lively mart situated a few miles below Hiu-ning-hien. The merchants of that place purchase the tea raised in the various districts around, not only of the basin of the Tsientang, but also of some which are situated beyond the watershed, on affluents of the Yangtse. From the Wu-yuen (Moyune) district even, which has its natural outlet to the Poyang lake, large quantities of tea are brought yearly to Tun-chi, for shipment to Ningpo. The yearly increase of the export of green tea from this place, and the correspouding decrease of that from Kiukiang, which has been noticed long ago in the Customs' reports of the two places, is due to this circumstance. It must be accounted for, partly by the greater safety, cheapness, and despatch, of transportation to Ningpo, as compared with that to Kiukiang, and, perhaps, partly to a difference in the extortion of taxes. The chops of tea are made up from an infinite number of small lots. Throughout Chekiang, during the tea season, one can see the peasants from the hills walking to town with a little bag, containing usually no more than from three to ten pounds of sundried tea leaves, and offering them for sale. These small parcels are purchased by the hongs, selected, classified, prepared, and made up into chops. From larger plantations the crops are secured beforehand by the hong merchants, who readily advance money on them. At Tun-chi, the tea is put on boats loading from 70 to 120 chests, or from about 40 to 70 piculs, according not so much to the size of the boats as to the state of the water in the river. The rate of freight varies therefore. At the time of my visit at Tunchi it was $31 for 100 chests; it ranges from $20 to $50 for the same quantity. At high water the boats take some lumber besides the tea. All the larger boats are fitted up for passengers, with three or four berths on each side, on which the merchant travellers, who are usually the passengers, puff away the time in opium. A Chinese passenger pays 1200 *cash*, or one dollar, for the passage from Tun-chi to Nichau (near Hang-chau). The journey up the river takes often twenty days and more, about ten men being required to drag the boat slowly against the current. The down trip is made, at high water, in five days; at low water nine days are required. Three or four out of a hundred vessels are said to be wrecked on the rocks in passing the rapids. The damage of the cargo is at the risk of the shipper, who takes the tea back to Tun-chi and selects what has remained uninjured. This loss should be added to the expense of freight. Of other expenses, there is only a tax of one and a half per centum ad valorem, to be paid at the boundary station between Ngan-hwei and Chekiang. The tea is delivered to hongs at Nichau, by which it is shipped to Ningpo.

6. *From Tunglu-hien to the Borders of Nganhwei.*

Tunglu-hien is situated on the Tsientang river, about fifty miles above Hangchau, at the mouth of an affluent from the left, the *Fan-sui* river. Thirty miles up this affluent is situated *Fan-sui-hien*, and again thirty miles higher up, on two different branches of the same river, the two cities of *Chang-hwa-hien* and *Yü-tsien-hien*. Fifteen miles north of the latter place rises the celebrated *Tien-mu-shan*, a high mountain range, from the slopes of which descend the headwaters of the Yü-tsien branch of the Fan-sui river. With the Tien-mu-shan and its western prolongation, the watershed is reached, with which the provincial boundary between Chekiang and Nganhwei coincides. A low pass leads across it to the head-waters of the *Ning-kwo* river, on which, forty miles downward, is situated *Ning-kwo-hien*, and thirty miles further down, the city of *Ning-kwo-fu*. The river empties into the Yangtse at Tai-ping-fu.

The Fan-sui valley is, as regards scenery, among the finest pieces of ground that I have seen in China. The hills are covered with vegetation, partly forest-trees, and partly a dense jungle of shrubbery, among which are the most exquisite flowering plants that adorn the gardens of Europe. A luxurious semi-tropical vegetation fills the gorges and recesses in the hillsides with indescribably rich and varied foliage. The branches and twigs are intertwisted with creepers, so as to baffle all attempts at ingress. Shade, after which the traveller in China so often longs in vain, is afforded in abundance by numerous groves of lofty trees, none of which, however, can rival those on the southern slopes of the Tien-mu-shan, as regards beauty and extent. A trip through these regions in the summer season is a source of incessant enjoyment, and repays amply the hardship of walking under a burning sun. There is, however, one drawback. While Nature is usually divested of its finest charms in China, too free action has been left to it here, of late years. The valleys, notwithstanding the fertility of their soil, are a complete wilderness. In approaching the groups of stately white-washed houses that lurk at some distance from underneath a grove of trees, you get aware that they are ruins. Eloquent witnesses of the wealth of which this valley was formerly the seat, they are now desolation itself. Here and there a house is barely fitted up, and serves as a lodging to some wretched people, the poverty of whom is in striking contrast with the rich land on which they live. The cities which I have mentioned, Tung-lu, Chang-hwa, Yü-tsien, Ning-kwo-hien, are extensive heaps of ruins, about a dozen houses being inhabited in each of them. Such is

the devastation wrought by the Taiping rebels, thirteen years ago. The roads connecting the district cites are now narrow footpaths, completely overgrown in many places with grasses fifteen feet high, or with shrubs through which it is difficult to penetrate. Formerly the valley teemed with population. The great number and size of the villages is evidence thereof, while the fine style of the houses, all of which were built of cut stone and brick and had two storeys, gives proof of the more than usual comfort and wealth that reigned here. The fields in the valley, as well as the terraced rice ground on the hillsides, are covered with a wild growth of grass, no other plants being apparently able to thrive on the exhausted soil. Plantations of old mulberry trees, half of them decayed from want of care, tell of one of the chief industries of the former inhabitants; in other places the ground is covered with perfect forests of old chestnut trees.

It is difficult to conceive of a more horrid destruction of life and property than has been perpetrated in these districts, and yet they are only a very small proportion of the great area of country that has shared a similar fate. One must have seen places such as these to value at their full extent the ravages which the races of eastern Asia are capable of performing when full sway is left to their excited passions. There can be little doubt, that the destruction of life, of which the province of Chekiang was repeatedly the theatre during its history, was not less fearful than it has been in the last instance. I used to enquire in different places into the percentage of population that had escaped death by the Taiping rebels. It was generally rated at three in every hundred. Of four hundred monks who lived before in the temple of Si-Tienmu-shan, only thirty survived after the rebellion; but the ratio is less in the villages and cities. Most people died from starvation, in the recesses of the mountains to which they fled, but still the numbers of men women and children killed by the hand of the rebels is excessively great.

The decrease of the productive power of the ransacked provinces, and the amount of taxes by which their exchequer is diminished, must be very large; and surprising figures would be arrived at, if it were at all possible to compute the damage which the reduction of the number of consumers in the provinces contiguous to Shanghai has caused to foreign commerce.

There is reason to expect that these regions will revive. The course of immigration has set in. In the Fansui valley I found quite a number of new settlers, mostly from Ningpo and Shauhing in Chekiang, but also a few from other provinces. They are less numerous than in Nganhwei, but the influx of people will probably increase.

It is an interesting subject of speculation for the national economist, to trace the causes of the exceedingly slow rate at which the country is recovering its productive power. Where there was formerly over population, a few individuals are now masters of the soil, and newcomers can purchase, at 1,000 *cash* (80 cents) a *mow*, as much as they like of the same ground which was worth, formerly, 40,000 *cash* a *mow*. Speculating on the basis of foreign ideas, one should think, that the few individuals would cultivate a comparatively large proportion of the fields, and accumulate wealth on a larger scale than when they had to struggle with numerous competitors. One should expect, too, that enterprising individuals would buy up large tracts of the cheap grounds, and put them under cultivation with hired labour. The variety and value of the agricultural products that can be raised, the exquisitely prosperous climate, the advantage of water communication with Ningpo, all these circumstances would appear to secure large profits for little labour. Yet, no such enterprise has been started, and those who cultivate the soil are poor. The newcomer goes to work as vigorously and industriously as does the Chinese emigrant in clearing the jungle of Farther India; and although his labour is limited to deep ploughing and putting the old irrigation works in order, yet the area put under cultivation is increasing at an incredibly slow rate. It appears, indeed, that a Chinese is capable of cultivating only a certain number of square yards of ground to every head of the population, and cannot overstep that limit with impunity. The method which he is accustomed to, of bestowing care on every single rice plant or millet stalk, may be among the reasons of this curious phenomenon. But the most potent causes are undoubtedly to be looked for, firstly, in the fact, that the arable soil throughout China is so exhausted of the most important ingredients as to be unable to yield a crop of grain unless well manured, and secondly, in the peculiar system of procuring manure, so different from the methods applied in Western countries. We may put it as a truism that, where the soil is exhausted, manure well applied means grain, and the quantity of one will, in a general way, determine the quantity of the other. Rice, for instance, is manured three times during its growth, and experience has taught the Chinese to apply to each acre the exact quantity of manure required for the healthy development of the rice plant. If he takes more, he reduces the area which he might cultivate, and if he takes less than the required quantity, his crop will fail.

Leaving climatical influences and accidents out of consideration, the quantity of grain produced in any region in China will depend in the first place upon the area put under cultivation and manured in the required degree; this area will be in exact proportion to the quantity of manure on hand, and this again will be as exactly proportionate to the number of human beings living within that region. Nothing shows so forcibly as this simple consideration the imperfection of the Chinese system of manuring, which is pointed at by learned enthusiasts in Europe as the apex of accomplishment in the agricultural arts. No improvements can be expected to come by the initiative of the Chinese. The inhabitants even of these desolate valleys are in possession of a few cattle for ploughing. Yet, with the evidence daily before their eyes showing how well cattle thrive, and to what inexhaustible source of manure, and therefore of grain, the luxurious pasture might be converted if more cattle were kept, this otherwise so practical and materialistic people did never grasp the idea of substituting

animals for the lack of human beings. In the Fansui valley alone, tens of thousands of cattle might be kept with little care.

The principal direction in which the agriculture of the Chinese needs improvement is thus clearly indicated. If more effective methods of cultivating the soil, and chiefly such as tend to improve the proportion of the area of cultivated ground to the number of inhabitants, are not introduced in China, it will take half a century before the devastated districts shall have regained their former productive power. On the other hand, the introduction of methods similar to those applied in Europe, and first of all, the creating another source of manure, would be attended with great benefits—to the native, who would be enabled to accumulate wealth more rapidly; to the government, which would have its revenue increased without waiting for the restoration of the former number of population; to the foreign merchant, who will profit by every increase in the productive power and wealth of the country he deals with. It is my humble opinion, that incalculable benefit might be conferred upon China by establishing industrial missions, where the inhabitants would be converted, by practical men, to improvements in agriculture and industrial pursuits. The material and intellectual welfare to which such a community of converts might be raised would, perhaps, prepare them better for receiving finally, and understanding, the Christian doctrines, than if the Bible is put at once into their hands and they are left otherwise in their abject state. Christian communities in China might then be raised to a standard above the general level, and actually ascend the first step on the ladder to Western civilization, while it is difficult for an unbiassed observer to discover now any difference in bearing or manners or mode of thinking between the Christian and the heathen Chinese. No proselytism can be so efficient, with an eminently materialistic people, as the example set by converts accomplished in those arts which, while raising the material welfare, stimulate intellectual development and improve the habits of life as regards order and cleanliness.

The salubrious climate, the fertility of the soil, the fine pasture, the wood-lands covering the hills, the fact that there are only a few inhabitants, and that no others than such as are determined to work and not addicted to opium are gradually swelling their number, and, what is not of the least importance, the extraordinarily cheap price at which the soil can be purchased, render the Fansui valley an exquisite place for attempting the experiment of industrial missions.

I hope you will grant indulgence for these general considerations, to which I have allowed myself to be carried away, from the simple statement of my observations. Little remains to be added as regards the Fansui valley. The hills on both sides consist of shists, limestones and sandstones of probably Silurian age, and other sandstones slightly more recent in origin. They are arranged in nearly parallel zones, in which I recognized the continuation of those which I had formerly come across farther west, in descending the Shun-ngan river, and farther east, in the vicinity of Hangchau. I left the Fansui valley by a pass west of the monastery on the southern foot of the Tien-mu-shan. In this delightful spot the tourist from Shanghai can procure himself, without much inconvenience, the enjoyment of some magnificent scenery. One of its summits marks the boundary between Chekiang, Nganhwei and Kiangsu.

7. *General Remarks on the Province of Chekiang.*

Before proceeding to the province of Ngan-hwei, I will recapitulate in a fewwords some of the general features of Chekiang.

With the exception of a small portion of the great plain, that extends from Kiangsu into Chekiang, and in which are situated the famous departmental cities of Hu-chau, Kia-hing, Hang-chau, Shau-hing, and Ningpo, the province is hilly throughout. The axial range of the Nanshan runs through the centre of it, from southwest to northeast, and divides the province into a northern portion, the greater part of which is drained by the Tsientang river, and a southern portion which is chiefly occupied by the Ta-chi basin. Enclosed between the mountain ranges are some fine valleys with broad alluvial bottomland. Such are the valleys of the lower Tsien-tang-kiang, extending from Hangchau upwards about sixty miles, the Lanki valley, which is the largest of all, the valley of Sin-chang-hien and Shing-hien. These are, besides some minor ones, all the valleys of note on the north side of the axial chain. On the south side, I know from personal observation only the exquisitely beautiful valley of Tien-tai-hien, from which the steep granite walls of the great mountain mass of the Tien-tai-shan rise abruptly; but there are probably others in the basin of the Ta-chi river. These valleys, which have probably an aggregate area of about 2000 square miles, are even now quite populous, but were much more so before the Taiping rebellion. They are capable of great productivity, chiefly where the soil can be irrigated.

From the hills and valleys of Chekiang, nearly all those products are obtained which I have mentioned in another page as being raised in the Nanshan in general. Tea is planted on the hills everywhere, mostly at altitudes between 1000 and 2500 feet. None but green tea is made, and the skill in preparing the leaf appears to be in some districts much inferior to what it is in others. There can be no doubt that the cultivation of the tea-shrub could be extended far beyond its present limits; and it is highly probable that the manipulations in preparing the leaf are, in the greater part of the province, capable of improvement. It appears that care is taken only in those regions of Chekiang which yield the tea for foreign commerce. The most valuable among the products of the province is silk. It is raised chiefly in the plain which extends along the coast, north of Ningpo, but also in the valley of the lower Tsientang, and in those of its affluents emptying at and below Tunglu; and besides, in the lower portion of every valley emptying either into the plain or directly into the sea.

The province of Chekiang is very poor in minerals. When speaking of the Nan-shan in general, I mentioned the occurrence of deposits of iron ore of little value, which give rise to a small iron

industry in Chu-chau-fu and Wan-chau-fu, and are scattered in various localities from Ningpo to the province of Fokien. Traces of copper ore are met with occasionally, for instance at the Tien-mu-shan and, according to current reports, near Ningpo. But they do by no means indicate, as is generally believed, the occurrence of valuable deposits of that ore. Chinese books are said to record the existence of certain metals in various localities; but these reports have probably no other foundation but the fact that occasionally a few specimens of one or another kind of ore has been observed.

I know of two places only where coal forms an object of mining. One of them is in the district of Kiang-shan, department of Kü-chau. I did not visit the place, but believe that it will not deserve much further attention, partly on account of its great distance from the sea, which would render it almost useless even if it were of a good quality, and partly because in the latter respect it appears to occupy a very inferior position. All the coal I have seen from that place consists of a dirty and very soft semi-anthracite possessing the colour and lustre of plumbago. As these specimens were from shipments made to Hangchau, for domestic use, they exhibited probably a fair average. The second locality is near the village of Wei-ping on the Shun-ngan river, close to the boundary of Nganhwei. I saw it in 1869. Immense quarries, evidently worked since remote times, line there both sides of the river. They exhibit very thick layers of black shales, which are strongly bituminous and impregnated with iron pyrites. Thin slabs and lumps of purer coaly matter are irregularly distributed through the shales. In the absence of workable accumulations of the genuine material, the shale itself passes by the name of coal. It is applied in burning lime, from a bituminous limestone, which is quarried on the same hill, and occurs partly in layers between the shales. A fire of charcoal and wood is first made, and the heat is then kept up by throwing in pieces of the shale. They keep glowing for a long time, until the bitumen and the sulphuret of iron are burnt, and leave an ash which is nearly as heavy as the original "coal." I have heard a third locality mentioned, in the department of Kin-hwa. The report originates probably in the occurrence of the name "Mei-shan" or "coal-hill," which is a lively little mart in the Tung-yang district. I found among the inhabitants not the slightest knowledge of the working of coalmines in present or past times; nor does the geology of the place make the occurrence of coal very probable. There appears indeed to be not the slightest prospect, that ever any valuable deposit of coal will be found in Chekiang.

It is with some hesitation that I undertake to present an attempt at estimating the population of the province of Chekiang. But it is desirable that we should arrive at some correct figures in respect to the statistics of China, and I cordially invite contradiction to my statements, if it tends to correct them.

If the area of Chekiang is computed on the great map of China published in Wuchang, we arrive at the following detailed figures:

	Statute square miles.
1. Plain north of Tsien-tang river (comprising the department of Kia-hing, and portions of those of Hu-chau and Hangchau)	2,500
2. Area of the basins of the affluents to this plain	1,600
3. Basin of the Tsien-tang river 14,875 sq. m., of which in Ngan-hwei 2,160, in Chekiang	12,715
4. Plain south of Tsien-tang river (comp. portions of Shau-hing-fu and Ning-po-fu)	1,250
5. Area of the basins of all affluents to this plain, and of all coast rivers between Shau-hing-fu and Ping-yang-hien	7,140
6. Basin of Ta-chi river	7,620
7. Area south of the latter	1,800
8. Area of upper course of some rivers flowing into Fo-kien	800
Total area	35,425

or about 36,000 square miles, if the islands are included.

Those portions of this area comprised under the numbers 1 and 4, and having an aggregate area of 3,750 square miles, are the southern extremity of the plain of the lower Yangtse and, like the rest of it, densely populated. Although it was undoubtedly larger in former time, an average of 500 inhabitants to the square mile is probably a very high estimate, if we include in it the country and the district cities. I add two millions besides, for the five departmental cities. It results from my previous description of Chekiang, that the rest of the province is very hilly; and although it contains about 2,000 square miles of tolerably well populated broad valley land, this is more than counterbalanced by large tracts of country which are nearly uninhabited. I believe I do not underrate the population in putting it down at 100 to the square mile.

We have then:

	Inhabitants.
3,750 square miles at 500 inhabitants per square mile	1,875,000
32,250 square miles at 100 inhabitants per square mile	3,225,000
Population of Hang-chau, Kia-hing, Hu-chau, Shau-hing, Ningpo	2,000,000
If we add for the fishing population on the coast and islands	1,000,000
We get at a total of	8,100,000

inhabitants, or 225 to a square mile.

It is my opinion that these figures are too high, and that an actual census would show no more than five or six millions. To quote only one instance. The basin of the Fan-sui river covers about 1,200 square miles. At the above rate for the hilly districts, of 100 to a square mile, it should contain 120,000 inhabitants. But in attempting to compute their actual number on the basis of personal observation, I got to consider 13,000 inhabitants as the highest limit within the range of probability.

Dr. Williams puts the area of Chekiang at 39,150 square miles, and the number of inhabitants, according to the census of 1812, at 26,000,000; this gives an average of 671 inhabitants to a square mile. The discrepancy between this statement and my own is due, in part, to the destruction of life by the Taiping rebels. But it should teach us, at the same time, to accept with distrust statistical figures made up by the Chinese Government. The number of 671 inhabitants to the square mile exceeds by more than one-half the density of population of Belgium, the most thickly settled country of Europe, and nearly four times the average density of population of France. These proportions appear quite unnatural, if it is borne in mind, that Belgium is eminently an agricultural, manufacturing and mining country, while Chekiang, with the exception of one-ninth of its area, which undoubtedly was formerly among the most densely inhabited portions of the globe, is covered with hills interspersed by a few valleys. Whoever has travelled through the province, must consider the number given by the so-called census as perfectly absurd. If the number of twenty-six millions is reduced to one-half, or thirteen millions, the average density of population would still have exceeded that of Belgium. It is not probable that it ever has been up to so favourable a proportion in the most flourishing times.

It should, however, be remarked, that there is no other province of China where the figures given by the census appear to have been so much exaggerated as in the case of Chekiang. Still it is difficult to be convinced of their general truthfulness, if the probability of a gross error has been found in one instance.

8. *From the Borders of Nganhwei to Wuhu on the Yangtse.*

The pass which I crossed in going from Chekiang into Nganhwei appears to be the only convenient passage across the boundary range dividing both provinces, east of Hwui-chau-fu. Yet it is in little use, because the direction of the trade of the regions on either side of the boundary is down the rivers. The name of the pass, *Tsien-chiu-kwan*, is owing to an old fort built on the top of it as a defence against the Nganhwei side. It shows that, at some former time, the pass was of greater political importance than now. Its altitude is no more than 1,000 feet above the level of the sea. The range to which it belongs consists here of granite. It has a general altitude of about 2,500 feet, but rises eastward to about 5,000 feet, in the two broad summits of the Si-Tienmushan and Tung-Tienmu-shan. About sixty miles west, the extremely rugged range of the Ta-hwang-shan rises abruptly to about 6,000 feet (according to aneroid measurement by Mr. Hollingworth), bounded distinctly east and west by two low and much used passes. Though not the direct continuation of the Tien-mu range, it belongs evidently to the same belt of ranges of which this forms a portion, and the distinctive character of which is their geological structure. I crossed this belt now between Fansui and Ningkwo-hien, where it has the width of fifty miles, and travelled formerly in it from King-te-chin in Kiangsi, by way of Ki-men-hien, to beyond Hwui-chau-fu. The whole belt is composed of the most ancient system of formations taking part in the structure of these regions, and is one of the two bands of them which I mentioned in another chapter as being parallel to the axial range of the Nanshan on its north-western side. The other of these bands extends along the southern bank of the Yangtse, where I know it by own observation for nearly two hundred miles, from the south-eastern foot of the Lui-shan, west of Poyang lake, to near Wu-hu. It comprises the Ta-hwa-shan ranges, and probably the sacred Ki-hwa-shan, and forms another important feature in the geology and geography of southern Nganhwei. The Heng-shan in Hunan, 260 miles south-west of the Lui-shan, is probably its continuation. Between these two bands is enclosed a belt of nearly forty miles in width, made up of more recent formations, among which are the coal-measures.

The parallelism of these three great belts is repeated in the large number of small mountain chains of which they are made up, but not so plainly exhibited in the river courses, owing to the circumstance that, as we proceed towards the Yangtse, branches of the alluvial plain accompanying that river encroach more and more, and with increasing width, upon the hills, extending and ramifying between them. They give an opportunity to the rivers to adopt a meandering course. The large ones of these are navigable in their lowest course by small junks, beginning at some distance below the place where the river reaches its own branch of the Yangtse plain. On the King river, which I descended, a number of shipping-marts, distant from each other from ten to fifteen miles, mark the head of junk navigation, as it shifts in the different sea-sons, with the rise and fall of the water in the Yangtse. Most rivers are navigable by boats far beyond the highest of these marts, but generally not so near their head-waters as in Chekiang.

Another important feature in the configuration of the country is the existence of a terrace of from 80 to 100 feet elevation, and undulating surface, which intervenes in many places between the plain and the hills. It is made up of inclined layers of very coarse deposits, varying in composition, all of which are cut off at a level on the top. This terrace covers a large space; if represented on a geological map, it would appear in the shape of numerous elongated tongues, dividing rivers and rivulets. In the single triangle formed by the cities of Ning-kwo-hien, Ning-kwo-fu, and King-hien, it covers probably several hundred square miles. It is an injurious element, economically, as it produces nothing of value and, though overgrown with grass and loose shrubbery, is almost barren for the practical purposes of the present inhabitants. The valleys immersed in it are, however, of extraordinary fertility. Their alluvial soil is sharply cut off at the slopes of the terraces. The formation of which they consist is what I have called the Tatung-strata, from the mart of Tatung on the Yangtse, where I first observed the terrace and the strata of which it is composed.

The general character of southern Ngan-hwei is determined by those features which I have mentioned—namely, the division into three great belts, from a geological point of view; the geographical subdivision of these into very numerous small ridges which partake in the

trend of the former, from S.W. by W. to N.E. by E.; the gradual setting in, between these ridges, of branches of the Yangtse plain, which increase in extent as we recede from the southern boundary of the province and approach the Yangtse; the intervening between these plains and the hills of a barren terrace. In the southern belt the scenery is still almost as lovely as in Chekiang. The valleys are narrow, the streams clear as crystal, the steepest hillsides covered with vegetation. People are scarce, but hospitable and good-natured. The hills are, however, more stripped of their wood than in Chekiang, owing to the wants of the population of the valleys below, to supply which no recesses in the hills are too remote, provided they still contain some timber of value. But even the hills adjoining populous districts near the Yangtse are rich in vegetation, chiefly in shrubbery, if compared with those of the northern provinces.

Nganhwei is known to be among the most productive, and to have been among the most populous, provinces of China; and although the Taiping rebellion was here attended by at least as great a destruction of life and property as in Chekiang, the productive power of the country is still great. Between the southern boundary and the Yangtse, tea is grown throughout the hills. Foremost in rank, as regards quantity and quality of tea, is the department of Hwui-chau-fu, the trade of which I have mentioned in connection with the Tsien-tang basin, in which the greater portion of the department is situated. The tea markets for the rest of the country are Tungliu, Tatung and Wuhu, to all of which the tea is carried down on navigable rivers.

The exuberant fertility of the soil in the lower portions of the province is not excelled by anything I have seen in temperate climates. No expense has, therefore, been spared in protecting the low lands by embankments and introducing a perfect system of irrigation. Both deserve the highest admiration. On the King river, I have walked for miles through fields of hemp the stalks of which were from eleven to thirteen feet high. Cotton, too, is raised in large quantity, and the state of the fields promised a rich harvest.

The fact, that these naturally rich regions are situated on the Yangtse, and communicate directly by water with other regions in which there is a surplus of population, render the rate at which the country is being resettled more rapid than it is in Chekiang. The government exhibits a wise liberality towards the new settlers, and it is astonishing what numbers of them have come to southern Nganwhei within the last two or three years. The traveller has often the greatest difficulty in making enquiries regarding the country or the road to some neighbouring place. There are instances where only the twentieth man he meets is an old resident, and it is these exclusively who are at all acquainted with the country. Most of the new men are from Hupé, but many are natives of Hunan, Honan, northern Nganhwei, and even Szechuen and Kweichau. In the destroyed villages they find easily a house that can be rendered habitable. Each man or family selects an unoccupied piece of ground, and starts immediately to work. After two years he is put in possession of it. But if before that time the former owner turns up, the squatter is obliged to take other ground. The favourite places are—firstly, the heads of valleys and low ravines, which have naturally the priority in the use of the water from the hills. They get it still perfectly pure, and free from decayed organic matter. The furthest recesses in the basins of rivers are therefore quickly regained to cultivation. The region next below can use only such water as has already done the service of irrigation on many rice fields above. They rank second in the speed of resettling. This is conspicuous where a river is accompanied by broad bottomland, in its upper course. On every rivulet coming down to it, the waving ricefields prove the reviving of cultivation, while the fine alluvial land, notwithstanding its inviting appearance, has not been touched by the plough since the rebellion. First in demand, however, is the broad alluvial land in the lower courses of the rivers; that chiefly which is enclosed by embankments. Here the restoration proceeds at the quickest rate.

I have it from the mouth of officials, that the ground is given to the settlers free of expense, and directly by the government. But the settlers were unanimous in naming a price, varying from 800 to 4,000 *cash* per *mow*, which they pay to the "*punti-jin*," that is, the original inhabitants. It appears that it is tacitly convened, to consider the survivors in each village as the lawful heirs of the abandoned fields, and to hold them entitled to an indemnity, perhaps because many a village was indeed inhabited by a single family or clan. The settlers agreed equally in the statement, that they pay nothing whatever to the mandarins, and that they enjoy great liberty, such as they were not accustomed to in their native province.

It seems indeed that the Chinese government acts with great wisdom in this matter of surpassing economical importance for the welfare of the Empire, and the question may appear justified, whether this wisdom is not an heirloom from former generations, and the present methods applied for resettling devastated regions only a repetition of those applied in many former instances of similar nature that have or may have happened in the history of China. If one considers the state of utter depopulation of the provinces infested by the Taiping rebels, and compares with it the records of the devastation of the same provinces committed-repeatedly in ages gone by—such as took place, for instance, on the accession of the present dynasty—it is scarcely too much to suppose, that the previous instances of devastation were as sweeping as the last has been, and that the process of resettling ransacked regions from other provinces, chiefly from those north of the Yangtse, which are since ages united under one rule, and did not undergo such protracted struggles on the change of dynasties, has been repeatedly applied within the long range of the history of China.

If this supposition should prove correct, it would explain, better than any other cause that may be suggested, the wonderful amalgamation into one homogeneous whole of the

various elements that must in former ages have been distributed through the vast area of the Chinese Empire, not only as regards the language, but also in respect to manners and customs, religion, and physical type. It is a fusion of this kind which is performing itself under our eyes in the southern part of Nganhwei. The immigrants speak several varieties of the mandarin dialect, all of which differ from the native dialect of the province into which they go, and one can witness daily the most ludicrous instances of linguistic confusion and misunderstanding. In a few decades, the fusion of these various dialects into one will be completed, and the new language will probably be a nearer approach to the northern mandarin dialect than that which is now spoken in Nganhwei. The same consideration would apply with equal force to the physical type, to superstitions and customs, and, perhaps to the form of religion, if similar differences did prevail in these respects as they do exist with regard to the language. There can be no doubt, that wide and well marked distinctions in all these respects have existed in the early days, when, in the northwestern corner of the present Empire, the Chinese, as a distinct nation, got into power under the Tsin dynasty. But if southern China, and in particular the hilly regions of the Nanshan, which are divided up into many distinct basins having even at the present day very limited communication with each other, was originally inhabited by ever so many tribes, differing among each other in type and manners and language, and distinct from the present Chinese, the conquering of those parts by hordes or armies from the North, their forcible depopulation, and the copious influx of immigrants from the North, would, if often repeated, have been sufficiently powerful processes for gradually spreading over the whole Empire that peculiar type of the human family which we know as the modern Chinese.

I will now conclude these remarks on southern Nganhwei, reserving some words in respect to the mineral resources of the country for my next letter, when I shall be enabled to treat the matter conjointly with the same subject as regards the neighbouring region of Nanking and Chinkiang.

F. von RICHTHOFEN.

No. V.

Amherst College LETTER

BY

from BARON VON RICHTHOFEN

ON THE

REGIONS OF

NANKING AND CHINKIANG.

SHANGHAI:
PRINTED AT THE "EVENING COURIER" OFFICE.
1871.

No. V.

LETTER FROM BARON RICHTHOFEN

ON THE REGION OF

NANKIN AND CHINKIANG.

To the Committee of the Shanghai General Chamber of Commerce.

Shanghai, August 31st, 1871.

Gentlemen,—In the last letter which I addressed to your Secretary, and which has been submitted to you, I attempted to describe the main features of the south-eastern provinces of China, and presented a few special notes on the province of Chekiang and the southern portion of Ngan-hwei. I notified your Secretary, at the same time, of my intention to examine the region of Nanking and Chinkiang. I have since then carried out this plan, and have now the honour to submit to you some notes regarding the same.

This is the first time that I have made a detailed exploration of a region of limited extent. Its situation in the vicinity of Shanghai, and its close proximity to the old southern capital of the Empire; the fact of its forming the north-easternmost outlier of the great belt of the Nan-shan, in a place where this is borded north by one of the few volcanic regions situated in China proper; its very intricate geological structure, which makes it quite a puzzle at first sight; its supposed mineral wealth which appears to have repeatedly furnished the subject for great though somewhat vague expectations—all these points of view contribute to render this a region of peculiar interest.

The nature and agricultural resources, as well as the commercial conditions of the vicinity of Nanking and Chinkiang are so well known, that I consider it superfluous to enlarge upon these subjects. I will restrict myself to a description of the outlines of the geological structure of the country, but not tire you with details of a merely scientific nature. As I have barely touched the subject of geology in my previous letters, I will make use of this opportunity to generalize my remarks to regions beyond the confine of the district I visited. They will also afford me an occasion for some notes on the mineral resources of the Lower Yangtse in general, gathered on my previous journeys, the results of which have not been made public.

Character of Country.

The great trading city of Chinkiang is situated forty-two miles east of Nanking, on the southern bank of the Yangtse, in a place where this is crossed by the Grand Canal, and at the same time at the head of tidal currents. A hilly region lies between both cities. Going up the Yangtse from the level land around Shanghai, a few detached hills rise from the plain, on the southern bank of the river, while to the north the alluvial bottomland stretches as far as the eye can reach. The character of the country changes as Chinkiang is approached. A series of a few small bluffs and rocks marks here the summits of a front-range, the rest of which is submerged beneath the plain. They commence at the isolated, picturesque rock of Silver Island, and extend forty miles west, but most of them are so covered over by Loess, that they can only be detected by close examination. A few miles south of the city, rises a more continuous, but still very low, range of hills. Going west, two other parallel ranges, the Ma-kia shan* (馬家山) and the Chang shan (常山), which rise about 800 feet above the sea, take its place, and soon develope, farther west, into a hilly region made up of groups of nearly parallel ranges. It continues to Nanking. This hilly belt has the width, from north to south, of from seven to ten miles. Its general trend is from west to

* Also called "Ma-shan." The foreign residents of Chinkiang know it by the name of "Lui-shan," which is not in use among the natives.

east; the various ranges have partly the same direction, and partly their line of strike is S.W. and N.E. Most of the ranges are elevated no more than from 600 to 800 feet above the level of the sea, but some of them attain, in their summits, an altitude of from 1,000 to 1,400 feet. For convenience sake, we may call the entire hilly region between the two cities the *Nanking Hills*. A terrace of Loess, from 80 to 200feet in height, fringes and isolates them on all sides, and makes up the intervals between the various ranges. On the northern slope, it spreads into the alluvial plain of the Yangtse, in the shape of several elongated tongues, the remnants of a once continuous sheet of Loess. On the west, it embraces a considerable portion of the city of Nanking, and fills the gap that intervenes between the hills east of that city and the next ranges south-west. South, it extends far into the alluvial plain surrounding Taihu lake, and to the east it connects the hills of Chinkiang with some other outliers farther off.

Opposite to these hills, on the northern bank of the Yangtse, the Loess takes a predominant position. It forms a large plateau with undulating surface of, probably, no more than 200 feet altitude, the shape and extent of which are quite unknown. A band of alluvial land, from one to six miles wide, separates the plateau from the river. Several truncated cones, some of them very broad and flat, others of short diameter, all of them apparently from 400 to 700 feet high, rise from the plateau. The peculiar character of the outlines renders the scenery on the north quite different from that on the south side of the river. Some of the cones are extinct volcanoes, others appear to be fragments of a volcanic table-land. A range of hills, different in nature from these, rises opposite Nanking. Their outlines betray a similarity in character and composition with the Nanking hills. I paid them a hasty visit, but will not include their description in this paper.

The Nanking hills cannot compare with the mountainous regions in Chekiang and Ngan-hwei as regards beauty of scenery, although they are not devoid of picturesque sights.† The views from the high summits are perhaps their greatest charm. The valley of the Yangtse is spread out below, with its majestic river, its labyrinth of canals and creeks, its numerous villages and cities, and the varied crops due to the fertility of the soil. And beyond, the volcanoes form an interesting and beautiful frame of the panorama, some of them being but dimly recognizable on the horizon. Rarely does a view from a high summit convey so perfectly the image of a map, owing to the many straight lines in creeks, fieldmarks and footpaths, which touch each other at all angles. The whole country suffers still heavily from the fearful devastation wrought by the Taiping rebels, and it will take a long time before it shall have fully revived. Of the alluvial lands, a good portion is again under cultivation, chiefly by the labour of immigrants. But all rising ground, a considerable area of which was formerly terraced and well-cultivated, is still a wilderness.

Geology of Nanking Hills.—Introductory.

Before entering upon an exposé of the main geological features of the Nanking Hills, I beg you to grant indulgence for a few elementary remarks on the mode and object of geological researches in unexplored countries, such as China is still to be considered almost in its whole extent.

The first aim of a geologist, when coming into such a country, is this, to establish the chronological order in which the various rocks that take part in the structure of the surface have been

†A perfect gem, as regards scenery, is the Hwei-chü sze(慧居寺) or Pau-hwa shan (寶華山) monastery. It is situated about 800 feet above the Yangtse, in a depression between the two summits of the Hwa-shan (山華), which are the highest in the Nanking hills, and can be ascended by an easy walk from the monastery. The buildings were formerly very extensive, and gave lodgings to eighteen-hundred monks, but they are almost completely destroyed, and no more than eighty monks are living now in the place. Even the ruins show that the buildings had high merit as regards architectural and sculptural beauty. The profusion in which white marble was employed shows of the munificence displayed. The temple dates from very ancient time. Many an Emperor has been living in it, and some are said to have spent here in holy retirement the last years of their life.

Hwei-chü-sze (generally known among the people as the "Hwa shan") is distant from Chinkiang about 25 miles. It can be reached on horseback or in chairs, by following the great Nanking road to Sha-su-kai, (下楚街), where a local road of six miles branches off through the hills to the temple. This village can also be reached from Chinkiang by boat, but only in the season of high water. Good accommodations do not exist at the temple, but can easily be arranged. I do not know of any place, within so easy reach from Shanghai, where a few days or weeks in summer or autumn could be spent equally well in pleasant retirement. It is chiefly the distant views, and the uncommonly luxurious vegetation spreading over the whole Hwa-shan, which are a source of true enjoyment. The only drawback is this, that the place lacks running water. The sportsman will find the hills near the monastery full of wild boar.

successively formed. He must direct his attention chiefly to those stratified rocks which were originally deposited at the bottom of the sea or inland waters, as in these the history of the earth and its organic life is most distinctly chronicled, and all other events, such as the action of elevatory forces, or the outbreak of eruptive rocks, can only be understood by the light which those observations of the first order afford. The principal guide in disclosing the order of succession of sedimentary rocks is given in the simple law, that, in a general way, the strata of later origin will overlie those which precede them in age. By an accurate observation of the subtle differences in the character of the various rocks he meets, and by extending and multiplying the observations of superincumbence as much as possible, the geologist will finally be enabled to arrive, more or less approximately, at the true sequence of formations in any given region. This result already will be capable of immediate application to practical questions. If, for instance, certain strata are found to carry coal-beds or iron ores, or deposits of rock-salt, or other valuable minerals, it will be comparatively easy to trace their existence in any given place in the neighbourhood, provided some of the overlying or underlying strata are visible and can be clearly recognized. Thus if, in a certain region, strata of limestone of a certain character, and distinct from other kinds of limestone that occur in the same region, has been repeatedly observed to underlie certain coalbeds, say of anthracite, the simple fact of the occurrence of that limestone in any locality, at not too great a distance off, will be strong evidence for drawing conclusions on the occurrence of anthracite in a certain position in close proximity, even though the coal-bearing strata themselves be not at all visible on the surface of the ground.

It must, however, be observed, that there are some drawbacks to an easy and definite ascertaining of the sequence of the strata. The first of them is, the re-occurrence, at different levels, or stations in the geological scale, of stratified rocks so similar in character that they cannot be distinguished from each other by the most accurate observation. Sandstones converted into hard quartzite are a stumbling-block of this nature in the regions adjoining the Lower Yangtse. They occur over and over again, frequently with a great vertical development; and in order to know what particular bed of quartzite one has to do with in any single instance, it is necessary to examine the strata above or below it. Another difficulty is, the fragmentary character of the sections; that is, the occurrence, in most places, of a detached group of a few stratified formations only. The cover of vegetation, or the alluvial soil of valleys, may set a limit to the observation; or elevatory forces may have brought comparatively recent strata into close contact with others much more ancient in origin, and the juxtaposition may be of such a nature as to render the gap in time, which divides both systems in respect to the epochs of their deposition, no longer recognizable. Observation not sufficiently extended may therefore lead to wrong conclusions. Instances of this kind are frequent in the Nanking Hills, and generally in the regions on the Lower Yangtse.

A third difficulty is of a geographical nature. The same system of strata varies in character as it is traced from one locality to other regions, in a similar ratio with that in which the conditions of sedimentary deposition varied contemporaneously in different portions of the bottom of the sea, at the time when the rocks were formed. The limestone which, in our previous example, underlies coalbearing strata in one region may be replaced, in another, by sandstones and shales formed contemporaneously with it; or the nature only of the limestone may vary, and in that case the fact of identity in position can only be arrived at by a very circuitous way. It is therefore evident, to what erroneous conclusions the geologist may be led in applying the experiences gained in one region directly to others a great distance off, unless other means are used to improve the defective evidence. Speculation on the basis of lithological analogy should be very carefully applied even in a country of little extent, such as England, or a single province of China; but it should be treated only as quite collateral evidence when such vast regions as the Chinese Empire are considered. Sweeping generalizations respecting the geology of the latter have been based on the fact, that limestone carries chertnodules in various regions. All these limestones were considered to be of contemporaneous origin, while it can be proved that they differ widely in age.

This geographical difficulty leads us to the second aim which the geologist must have in view in a new country. It is, the mutual comparing of the sequence of formations as found in various regions, and the establishment, by means of the fossil remains of animals and plants, of certain definite horizons,

that is, of contemporaneous deposits. If these horizons are then compared with, and their exact geological position is determined in reference to, the well established horizons in the series of sedimentary formations in Europe or America, then the ground-work for exploring the geology of vast regions is founded on a firm basis, and the subsequent labour, of completing the results and of laying down the surface geology on maps, is rendered easy. Very valuable horizons are given, for instance, in some of the Chinese coalmeasures, which abound in fossil remains. The scientific value of geological observations will depend, in a great measure, upon the degree of perfection in which these results of the second order have been obtained. But a practical importance, too, attaches directly to them. If, for instance, some great coalfields of China, furnishing otherwise few data for forming an opinion in regard to their value, were proved to correspond in age exactly with the same carboniferous formation to which all the great coalfields of Europe and North America belong, a prejudice in their favour would at once be formed; for the probability of their technical value would be far greater, than if they were shown on examination to correspond in age with other formations in which coalfields of high value have been found either in a limited extent or not at all, in other countries.

The first of the two aims which I have described is attained by field-work alone, and is among its immediate objects; the other can also be approached in the field, but definite results will only be arrived at by long and laborious work in the study, consisting in the mutual comparing of the results of the first order, and chiefly in the exact examination of fossils. I am therefore not prepared to state now in regard to the second and higher aim anything beyond some general remarks, and shall not be able to give more, until the considerable material contained in my journals collections and maps shall have been worked up in Europe; while in regard to the first line of results my travels in China have enabled me to gather a large amount of material.

It is these results only, relating to the sequence of formations, of which I beg to submit now the outlines, with reference to the region of Nanking and Chinkiang.*

The study of the geology of China carries us back to the early ages of the earth's history, when, probably, at least the whole of eastern and northern Asia were covered by the sea. Sedimentary deposition took then place at its bottom through long periods, embracing portions, and perhaps the whole, of the Silurian, Devonian and Carboniferous epochs as distinguished in the geology of Europe. In the north of China there are formations which appear to be of a considerably higher age, but nothing positive can be established in regard to it. During the latter end of the Carboniferous epoch, some portions of China, were laid dry, while sedimentary deposition continued in others, probably to the Triassic epoch. In some inland basins, such as those in Shansi, Shensi, Szechuen, and Hunan, it may have lasted still longer, giving rise to the formation of salt deposits. During the Jurassic, Cretaceous, and Tertiary epochs, when portions of Europe were covered by a sea at whose bottom there was an immensely developed animal life, China formed already part of a large continent; and there is not the slightest evidence to show, that any of its mountainous regions have ever again been submerged beneath the level of the sea.

I. *The Peking-system.*

The most ancient group of formations taking part in the geological structure of the provinces adjoining the Lower Yangtse contains rocks of uncommonly distinct characters, by which they can be easily traced from province to province. Their chief and most characteristic development is in Shantung, Chili, and Manchuria, where they largely partake in building up the mountain ranges. From their great development in the surroundings of the capital, I have called this group of formations the Peking-system. I traced it to the borders of Mongolia and Corea, and to Japan. It is probably the most largely distributed and equally developed group of formations in Eastern Asia. On the Lower Yangtse, its middle portion consists of an alternation of beds of green clay-slate, with others of lime- stone, those of either kind of rock varying in thickness from

* In entering upon the subject of the order of succession of sedimentary formations, I feel it my duty to mention the high appreciation which I have of the merits of the labours of my two only predecessors in Chinese geology, Mr. Pumpelly and Mr. Kingsmill. The way in which the former has traced the outlines of the geology of China is a masterpiece, considering the scanty information at his command, and his treatise will be an important guide for every successor in his work. The valuable details by which the acute observations of Mr. Kingsmill have enriched our knowledge of the regions adjoining the Lower Yangtse will be always equally appreciated. If yet, in regard to the sequence of formations, I have to differ, in the main features as well as in nearly every particular, from the results obtained by those two gentlemen, the reason is simply this, that I have had the good forune of seeing a much larger extent of country.

a few inches to several hundred feet. The green slate prevails in the lower, the limestone in the upper half of this central group, which, as a whole, is underlain by immense thicknesses of green clay slate alone, and overlain by a few thousand feet of limestone. The slate in its lowest levels, and the limestone in its highest portions, alternate with sandstone, and the whole series begins and closes with considerable thicknesses of sandstone partly altered into quartzite. I will briefly describe the most important of these rocks, following their order of succession from the highest to the lowest :—

(8) Fine-grained argillaceous sandstone ot dark green and grey colours. At Yü-tsien hien (Chukiang), it is at least 2,000 feet thick, and regularly overlain by argillite, which is broken up into shivery fragments. The strata are from a few inches to two feet in thickness, and often separated by thin layers of shale.

(7) Black limestone, with veins of white calcspar. It is hard and splintery, and mostly stratified in very thick beds.

(6) Quartzose sandstone, locally altered into quartzite. Its lower portions alternate with limestone.

(5) *Sinian limestone.*—It is rare to meet with sedimentary rocks offering so peculiar characters that they are distinguished by them from other rocks of the same class as generally occurring. The truly grand formation which I designate by the name of "Sinian limestone" is one of these instances. It presents a hundred varieties, among them a number of quite peculiar types, to describe which would take too much space on the present occasion. I will mention a few of them. One of the prevailing types resembles the "Virgloria limestone" of the Alps, which is there a characteristic and wide-spread formation of Triassic age, and a few hundred feet in thickness. Like this, it is separated into layers remarkable for their very uneven surfaces. They vary usually from one to five or six inches in thickness. The face on either side is full of irregularly distributed flat grooves filled with a slaty substance, of green or black colour and greasy touch. This mineral spreads, with unequal thickness, over all the faces of the slabs of limestone, and separates them from each other. The structure is well exposed on vertical walls cut through the rocks, at right angles to the plane of stratification. All the lines of the latter, though parallel in a general way, are undulating, and the undulations of each line are independent of those of the next line above or below. As the layers of the green substance resist the influence of the atmosphere more than the limestone, and become very hard on exposure to the air, they are jutting out from the wall and give it a rough aspect. This character is frequently noticed in regions composed of Sinian limestone. Many variations in appearance are produced by the prevalence, in quantity, either of limestone, or of the green substance. In the first case, great thicknesses of limestone are quite solid, and unbroken by planes of stratification; but their existence is indicated by many isolated flat bodies of lenticular shape of the green substance, which are distributed in parallel lines. But when the slaty substance prevails, it forms a connected mass, with many irregular lumps of limestone enclosed. On weathered surfaces these give rise to as many deep grooves.

Another series of varieties is produced by the occurrence of silicious layers, which are usually very straight and even. Strata are frequently met with made up of alternating layers of limestone and chert, each of which has the thickness of a sheet of paper. From this size to several tens of feet, all gradations are represented in the thickness of the strata of chert; also all possible gradations in respect to regularity, varying from the shape of perfectly straight and continuous sheets to that of profusely distributed chertnodules of irregular form.—Another variety, which I came across in the northern provinces, is a black oolithic limestone of very distinct character. I found it from southern Shantung to the borders of Corea, where it is full of fossils, chiefly *Trilobites*. It can be broken into regular and evenfaced slabs of almost any required size, and is largely used in the construction of monumental buildings. South of the Yangtse, it appears to be represented by a black and exceedingly fine grained, but distinctly granular limestone of slaty texture, which is eminently useful for technical purposes. These are some of the prominent varieties of the Sinian limestone; pages would soon be filled if I were to make their list more complete. The most noteworthy fea-

ture is this, that the peculiar characters of these rocks are alike through distant regions. In the province of Chili, the entire formation is converted into crystalline limestone, aad yields the various kinds of marble that adorn the monumental and palatial buildings in and near Peking.

(4.) Although not distinctly separated stratigraphically, an alternating series of beds of Sinian limestone and King-te-chin-shists, which underlies the compact masses of the former, may be considered as a special group within the Peking-system. It is probably the same green substance forming thin sheets between the strata of limestone above, which, in following the series downwards commences to constitute, by itself alone, thick beds varying in thickness from an inch to a few hundred feet. The beds of limestone which are intercalated vary in thickness within the same range of figures, but are thinning out as the lower limit of the series is approached. Then begins the exclusive domain of the

(3). *King-te-chin-shists.* * These are strata of an imperfect argillite, of green and grey colours. The cleavage plane coincides with that of stratification, and is generally very smooth and even, though sometimes finely rippled. These shists occur on the south-eastern slope of the Liushan near Kiukiang; they take a prominent part in building up the Ta-hwa-shan ranges, which accompany the Yangtse opposite of Nganking, and the range of the Tien-mu shan, on the boundary of Ngan-hwei and Chekiang. They attain an extraordinary development in northeastern Kiang-si, around Lo-ping hien and King te-chin, and continue from there to Kimen hien and Tun-chi, in south-western Nganhwei. It is not rare to find thicknesses of two or three thousand feet of these shists exposed to view, without a chance of seeing either top or bottom of the series; but near King-te-chin their thickness is so great, that I hesitate to give an estimate of it. The soil which they yield by disintegration is not rich, yet gives rise to pretty scenery, and appears to be well adapted to the growth of the tea-plant.

(2.) Alternating series of King-te-chin-shists and sandstones.—In a few places only, chiefly at the southern foot of the Tien-mu shan, and on the King-te-chin river, I found several beds of very hard and perfectly white sandstones intercalated between the shists, in their lowest portion.

(1.) Certain very hard quartzose sandstones in the Tang-sui valley appeared to me to form the lowest bed of strata in this region; but this observation is not positive. In Shantung, however, quartzose sandstones of reddish colour, but only a few hundred feet thick, underlie the entire series of the Peking-system.

The reason why I have united this long series of formations under one common name is this, that I did not notice any break in the continuity of sedimentary deposition. The gradual development of each one of the prominent formations, by interstratification, from that which is next below, contributes, too, to let the entire series appear as an aggregate whole which can only artificially be subdivided into separate groups. Future researches will complete, and perhaps correct, the series; and it is not improbable that other formations, below and above those which I have mentioned, will be found to belong to the Peking-system. I have attempted in vain to estimate the thickness of those which have come under my observation. Several thousands of feet of strata were often visible at a time, but in every instance they constituted only a portion of the body of the entire series.

Outflows of granitic rocks, and violent disturbances connected with them, brought the epoch of sedimentary deposition to a close, or at least, did not allow the next following strata to be conformably deposited upon the highest of those which preceded them in age.

I know of two parallel belts on the lower Yangtse which are made up of the strata of the Peking-system. They are those which I mentioned in the general description of the Nanshan, in my last letter. The first of them separates the provinces of Chekiang and Ngan-hwei. It has the

* In some private geological letters published in Boston and Vienna, and written after my first trip in China, in January and February 1868, which had for its object the geological exploration of the banks of the Yangtse from Hankau to Nanking, I described these shists by the name of the "Liu shan-shists," and the Sinian limestone by that of "Matsu limestone," both names being derived from the localities where I first met with both formations. Afterwards I traced them over large tracts of country, and consider now these two local denominations as no longer applicable. I found the shists nowhere so largely developed as near King-te-chin, east of Poyang lake, the celebrated place which exclusively furnished the world with porcelain during, probably, more than two thousand years. The Sinian limestone appears to be *the* characteristic rock of China, and deserves to take its name from that of the whole country.

width of fifty miles between the cities of Fan-sui hien and Ning-kwo hien, and appears to follow the watershed southwest. It crosses the headwaters of the Shun-ngan kiang, in the department of Hwui-chau, and is lost under the recent deposits of the basin of the Poyang lake.

The second belt is immediately south of the Yangtse. I did not observe any rocks of the Peking-system between Hankau and Kiukiang. But they begin south of this city, on the south-eastern slope of the Liu-shan, and thence continue to the neighbourhood of Wu-hu, forming a number of very fine mountain-ranges, with a south-westerly and north-easterly trend. Although lacking the knowledge of the connecting link, I believe that the bluffs which face the Yangtse south of the Nanking Hills are the northeastern-most outliers of this second belt. They commence with a long and precipitous bluff on the southern side of the Strawshoe channel, immediately east of Nanking, which consists of strongly altered, very silicious limestone. The next place is three miles east of Lung-tan (龍潭), where King-te chin-shists, standing on edge, crop out in very low hills and, for about three miles, form the base of the overlying rocks of the coalformation. A few miles farther on, follow a few granite bluffs, near the village of Sha-su-kai (下楚街), 20 miles west of Chin-kiang; and finally, Golden island, Silver island, and the other bluffs near Chinkiang, some of which scarcely protrude from under their cover of Loess. They consist of highly altered and disturbed strata of shists, limestone, and sandstone, intersected by dykes of granite. It appears, that the shists and quartzites in the surroundings of the hot springs of Tang-sui (水湯), on the southern side of the Nanking Hills, must be referred to the same ancient group of formations.

The stratigraphical development of the Peking-system in the north of China differs from that here described. In the province of Shantung, for instance, where they have not undergone any disturbance of note, the green King-te-chin-shists are represented by red clayshales, which probably indicate the original state of the formation.

This great system of sedimentary rocks, if I am allowed to judge from a preliminary determination of the fossils which I collected in it, appears to correspond in age with a portion, or the whole, of the Silurian system.

The rocks of the Peking system do not contain any useful minerals, on the Lower Yangtse. This fact, and the insignificant part which they take in the geology of the Nanking Hills, may make it appear that I have devoted too much space to their description. But they are of such paramount importance in the geological structure of China generally, and make up so many mountain ranges by themselves alone, that I believe I have hardly done them justice yet, even in the narrow limits of a letter.

II. *The Nanking-system.*

Under this name I comprehend a series of formations which occupy a conspicuous position in the geological structure of the Nanking Hills. It presents here a greater variety of stratigraphical development than the contemporaneous deposits in other portions of China. The Nanking system appears to correspond, approximately, with the Devonian system of Europe, and from its limestone-strata are probably derived the fossil brachiopodes which are sold in Chinsee drug stores and were till of late the only determinable fossils known from China. The similarity in character exhibited by the Silurian rocks through a large portion of China is not equally repeated by the rocks of this the next following period; and much more difficulty than in the former case is experienced in drawing parallels. I will therefore, restrict myself to a description of the mode of development of this formation as it exists in the Nanking Hills.

The Nanking-system consists here, essentially, of quartzose sandstones. Most of them are fine-grained, others are coarse grits, and in some cases they are mere conglomerates of large quartz pebbles. A few argillaceous beds are intercalated, as well as two or three of limestone, of from 200 to 600 feet thickness each. The aggregate thickness of the entire system is at least 5,000 feet, but would probably be much more, if all the formations of which it is composed in adjoining regions were represented in these hills. It is a peculiar feature of the sandstones, that they are often hardened and converted into quartzite. This resists denudation more than most other rocks. It composes

therefore, nearly all the summits and ridges of those ranges which are made up of rocks of the Nanking-system; limestone and shale occupying subordinate positions.

Within, and eastward of, the city of Nanking, these rocks are exhibited in long sections, chiefly in the *Chung-shan*(鍾山), a conspicuous summit, about 1,100 feet high, at whose southern foot are situated the tombs of some of the Emperors of the Ming dynasty. The strata of which it is made up dip southeast, at an angle of 33 degrees. The slope of the hill is very gentle on that side, and rises to an elongated crest, which trends southwest and northeast; here, the strata are broken off, and the steep north-western slope exhibits very distinctly over a thousand feet of stratified rocks. Northwest of this large isolated hill, a rolling country of five miles in width extends to the Strawshoe-channel, a branch of the Yangtse. It consists chiefly of Loess. But a number of low hills protrude from underneath it. All of them expose strata of a certain portion of the Nanking-system. Conspicuous among them is a variegated conglomerate of pebbles of quartz that have white, red, and yellow colours and the size of hen's eggs. This egg-conglomerate is a useful guide, although of quite local application, for comparing the strata in various places. Northeast of the Chung shan, and in the front range of hills, is situated the *Si-hia shan*, (西謝山) *or Single-treehill, 960 feet high, an important landmark for navigation on the Yangtse. It is composed of rocks of the Nanking-system, bent up in a steep fold, with a strike from southwest to northeast. On the river side, the strata dip northwest at a steep angle, on the opposite side, just as steep southeast. They contain another of those beds that can be easily recognized wherever met with. This is the *Si-hia-limestone.* It is of black colour, slightly bituminous, and some of its strata are full of chert-nodules. Fossils are frequent, but not distinct; corals and sponges are, however, well exposed on the weathered surface. This limestone is always accompanied by iron ores.

East of the two hills mentioned, about two thirds of the Nanking Hills are made up of rocks of the Nanking-system, but in such a way, that they can only be recognized by laborious investigation. To establish their order of succession with an approach to completeness, is a task left to more detailed observations than I had the time to make. The strata are bent and twisted, and have their sequence often entirely reversed, owing to disturbances that were connected, first with the eruption of Syenite, which makes up many hills by itself alone, and then, by the intrusion, between the strata, of numerous dykes of dioritic porphyry. The dip of the strata varies in an irregular way, and rocks which are widely separated in age are brought in close contact. To these difficulties must be added the fact of the great similarity in character of the quartzites of various levels, which cannot be distinguished from each other, lithologically. The occurrence of well-determinable beds, such as the egg-conglomerate and the Si-hia-limestone, is in these cases of great value.

All the ranges made up of these twisted strata have a strike from west to east, and are thereby quite well distinguished from the numerous ranges of the Nan,shan. The first of them, east of the Si-hia-shan, and at the same time the most prominent range of the Nanking Hills, is that of the *Hwa-shan*(華山). It is at this place separated from the river by the *Lung-shan range* (龍山), which is built up of more recent rocks; but in its course to the east, after a short interruption south of Sha-su-kai, continues as the front range, for about twenty miles, to Chinkiang. The *Siang-shan* (相山), south of Kaotse, the *Ma-shan* (馬山) six miles south-west of Chinkiang), the *Chang-shan* (常山), (a long ridge south of the Ma-shan) are made up of the rocks of the Nanking-system. The hills south-east of the Hwa-shan, and southwest, towards Pa kwei miao, are similarly constituted, but contain only a few dykes of eruptive rocks, and show less signs of disturbances of stratification.

On account of the reasons mentioned, I cannot claim to have firmly established the sequence of the formations of the Nanking Hills. I give therefore the following table under reserve, trusting that it may serve as a guide for reference to future visitors. It shows, in the vertical columns, the order of succession of the strata, in various localities between Nanking and Chinkiang, and is arranged, horizontally, in such a way as to exhibit, on each separate line, what I consider to be contemporaneous deposits.

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* This is the provincial pronunciation; in the Peking dialect it would be Si-sie.shan.

	Chung shan.	Si-hia shan.	Hwa shan.	
16	.....	.....	.....	16
15	Egg-conglomerate (1)	.....	.....	15
14	.....	.....	.....	14
13	Very coarse sandstone & conglo-	.....	.....	13
12	Coalshale. .....[merate.	.....	.....	12
11	Soft yellow sandstone.	.....	.....	11
10	Quartzose conglomerate of summit	.....	.....	10
9	Red sandstones.	Red sand'nes of great thickness(2)	.....	9
8	Quartzite.	Sandstones and Quartzite.	.....	8
7	Shale with iron ore (?)	Shale with iron ore.	.....	7
6	.....	Sihia limestone.	Sihia limestone.	6
5	.....	Soft brown sand'nes & congl'rate.	Sandstone & Quartzite.	5
4	.....	Variegated shales (with iron ore).	Grey and variegated micaceous shales (at monastery.)	4
3	.....	.....	Quartzite with one or two beds of limestone and shale (3)	3
2	.....	.....	Dolomite (4)	2
1	.....	.....	Red micaceous clay shales (4) ...	1

	Between Tangsui & Pa-kwei miao	Pa-kwei miao.	Pass 3 m. N.W. of Pa-kwei miao.	Ma-kia shan and Siang shan.	
16	.....	.....	Dolomitic conglomerate. (5)	.....	16
15	.....	.....	Egg-conglomerate.	.....	15
14	.....	.....	Red clay.	.....	14
13	.....	Coarse sandstone. ..	Coarse sandstone; soft, yel-	.....	13
12	Quartzite.	Coalbed.	..... [low	Bed of graphite.	12
11		Soft yellow sands tone,	.....	Quartzite	11
10		[coarse grained	.....		10
9		.....	.....		9
8		.....	.....		8
7	Shale with iron ore.....	.....	.....	Shale with iron ore.	7
6	Sihia limestone.	.....	.....	Sihia limestone (converted	6
5	Quartzite.	.....	.....	Quartzite. ...[into marble.)	5
4	Shivery shale.	.....	.....	Shales.	4
3	Quartzite.	.....	.....	Quartzite and limestone. (6)	3
2	.....	.....	.....	.....	2
1	.....	.....	.....	.....	1

By correcting and completing this table, it will not be difficult to arrive at the true sequence of the Nanking strata in these hills, chiefly if the assistance is made use of, which the examination of adjoining regions would afford. The Tsien-tang river is accompanied, on the northern side of its lower course, by a belt of hills consisting chiefly of sandstone and quartzite, between the strata of which beds of limestone and shale are intercalated. It extends west beyond the Shun-ngan kiang, and east to Hangchow, a distance of about a hundred miles. All these rocks, including some beds which contain traces of coal, must be referred to the Nanking-system; they constitute, farther north, the islands in the Tai-hu lake and many isolated hills in the plains around it. Here, and around Sihu lake, an easy opportunity is given to get acquainted with, at least, a portion of this formation.

(1). This occurs two miles north of the Chung shan, in low hills. The strata 7 to 13 are the profile across the Chung shan itself; most of them reappear in the low hills between it and the Strawshoe channel.

(2). These red sandstones are northwest of the Si-hia shan, where they make up a line of bluffs facing the Yangtse.

(3). The strata which are here united under one head make up, probably, a considerable and distinct portion of the Nanking system. But as they occur only in that line of hills where all the strata are twisted and contorted, their sequence cannot be made out. One of the limestone beds has such a distinct character that it can always be easily recognized. The rock is light grey; but fractures of it are covered with darkgrey parallel streaks, which are not continuous but much interrupted. Wherever the rock occurs, it is much used as a building stone, for instance at the temple on the Hwa shan. This limestone is accompanied by very even-faced hard shales, quite distinct from those of No. 4.—This portion of the formation appears to be developed near Hangchow, and higher up on the Tsien-tang river.

(4.) These strata, which I did not observe otherwise, form a pretty section on the northwestern foot of the Hwa shan range, where hardly any disturbance has taken place. The red shales are about 300 feet thick, the dolomite 200. Above it follows quartzite.

(5). This series of No. 16.15.14.13 is exposed in a very distinct section on the western road from Tung-yang to Pa-kwei miao. The dolomitic conglomerate consists of a dolomitic matrix, with irregular fragments of limestone enclosed. This rock, as well as the "red clay," are different from the strata 1 and 2 of the Hwa shan section, yet in so close vicinity to them that there can be no identity between both.

(6). These rocks do not occur on the Ma-kia shan, but in the western continuation of the range.

small wooded valley running from east to west, and drained in the same direction, towards Nanking. The narrow strip of its alluvial soil is bounded, south, by steep slopes of quartzite and, probably, Sihia limestone, covered with wood; and north, by gentle hills from which some higher summits rise at little distance. Close to the alluvial strip, on its northern side, stands the temple. It marks the western termination of a short line of abandoned coal mines trending east and west. The mines were closed in consequence of the Taiping rebellion, then again worked by the rebels, and are completely abandoned since six years. The works have since caved in; the shafts are filled up; and it is not possible to see now of the coalbed anything more than, that it strikes from east to west, dips eighty degrees south, is enclosed between coarse grits, and accompanied by very little black shale in which there are no very distinct vegetable remains. An imperfect opinion on the quality of the coal can be formed from small fragments of it which are scattered on the dumps. It is perfectly black, of moderately bright lustre, uneven fracture, and very brittle. It appears to be a semi-bituminous coal and was chiefly used in blacksmithing work. I was unable to get reliable statements as to the depth of the works, and the price at which the coal was sold. The latter appears to have been high, but the great ingress of water appears to have not allowed working beyond the depth of about eighty feet. The thickness of the coalseam is said to have been very irregular.

People in the vicinity of the mines say, that the officials do not allow the re-opening of the mines. The locality is so favorably situated, that even a few narrow seams of good coal might be worked with advantage, if the mines were in a dry place. But in this instance, it appears that we have one single seam of coal, of little though varying thickness, and in an unfavorable position for working. As the coal, besides, does not appear to be beyond mediocrity, it is not probable that it will be possible to work the mines of Pakwei miao, profitably, beyond a very limited depth. There are, however, fair prospects of finding the same coal-bed in other places, between the temple and the city of Nanking, and perhaps in a better position for working. Such a place is, for instance, near the Ming-tombs. On a visit to them, in the winter of 1868, I noticed, on the slope rising from them to the north, coalshales cropping out between coarse grits. They dip, with these, about 33 degrees south. According to popular report,

The Nanking-system is richer in useful minerals than the Peking-system. I will enter into a description of those which occur within the limits of the Nanking Hills.

1. *Coal of Pa-kwei miao* (北魁廟).—The temple of Pa-kwei is a very small ruined building, about 14 miles east of Nanking, and six miles south of Tung-yang (東陽), a small town which can be reached by boat from the Yangtse, at high water. It is situated in the bottom of a coal mines were worked there at some former time. The cover of vegetation, and the adjoining alluvial soil, conceal the coalbearing strata around Pa-kwei-miao so as to render exact observation beyond what I have noticed, difficult. But it appears, that the strata which contain the coal-bed are the southern portion of an anticlinal fold, the northern portion of which dips at a low angle to the north. If this view should prove correct, then there is good prospect of finding the coal bed within a mile north of the temple, with the same low northerly dip and at greater elevation above the valley than near the temple, and altogether in a more avourable position for working.

Plumbago of Kao-tse.—The village of Kao-tse, (高子崗) is situated ten miles west of Chinkiang, on the highroad to Nanking, and midways between the Yangtse and the front range of hills. These consist here of various strata of the Nanking-system, together with granite. Quartzite is predominant among the rocks. In crossing the range (Siang-shan) southwest of Kaotse, a place is soon reached, where a layer of plumbago is intercalated between strata of hardened sandstone which, in close vicinity, are cut off by granite. The seam of what may really be called plumbago is only a few inches thick; but also if reduced to these narrow limits, the mineral is perfectly valueless, being too impure for technical application. It is accompanied on either side by dark argillaceous matter impregnated with plumbago. The thickness of the entire layer of what has been speculated upon as a mine of wealth is thus swelled to two or three feet. The place is interesting only inasmuch as it affords an instance of a coal seam metamorphosed in contact with granite. The layer of plumbago is probably identical, in stratigraphical position, with the coal bed of Pa-kwei miao.

Iron ore of the Nanking Hills.—Of all the mineral products of the Nan shan, the iron ores have the greatest intrinsic value. They are invariably associated with the Si-hia limestone, being chiefly imbedded in sandy shales which separate it from the overlying sandstone, in layers from

an inch to two feet in thickness. They are also disseminated in nodules through the upper layers of the limestone, which may be termed a calcareous shale. I met with them first on the Si-hia shan or Single-tree Hill. They occur here in profusion on the summit, and on the ridge which juts out from it to the west. Extensive waste dumps give evidence that they formed the subject of considerable mining, probably in some remote age. West of the Si-hia Hill I did not meet with them. I owe the notice of their occurrence at the foot of the Chung-shan, as given in the table, to a paper by Mr. Kingsmill. But east, they are largely distributed, the Si-hia-limestone being always a safe indication of their existence in the vicinity. I met with them in the range of the Hwa shan, and, in several places, in the front range between it and Chinkiang. The locality which has chiefly come to the knowledge of the foreigners is, the Siang shan and Ma shan, south of Kao-tse, where they are exposed in abundance by the marblequarries. The hydrated oxide of iron (limonite in its various forms) prevails largely; but the pure oxide (hæmatite) occurs too; and where metamorphosing agencies have been at work, both kinds are converted into magnetic iron ore. In this form it accompanies the marble of Kaotse. In every locality, there occurs some apparently pure iron ore, and some manganiferous; and besides, in a few places, pure ore (peroxide) of manganese. At the old mines on the Si-hia shan, the two latter kinds of ore were thrown on the waste-dumps; probably, the better kinds of iron ore only were technically used.

Notwithstanding their intrinsic value, their excellence in quality, and their profuse occurrence, I consider it doubtful whether it will be possible, for a long time ahead, to use the iron ores of the Nanking Hills profitably for the extraction of the metal. Cheap fuel is the prime condition. At present it is not to be got. Nor would that want be supplied if the coal mines in these hills were re-opened, because, independently of the cost of extraction, the money value of the coal would, at any time, be a near approach to the price paid at Shanghai for coal of corresponding quality. Besides, the mines, on account of the limited area of coal bearing ground, would not be able to keep up the supply for a sufficiently long time to warrant the expense of reecting large smelting works, solely on the basis of the occurrence of coal in close vicinity to the iron ore. Although labour and ore would be cheap, it is therefore not probable that, under existing circumstances, any iron produced from the ores in the Nanking Hills could compete with imported English iron. And, supposing the case that, either by improvements in the means of communication, or by the discovery of valuable coal beds in the vicinity (which is very improbable), conditions could be improved so far as to allow Nanking iron to drive English iron from the market, it must still be considered, whether there are not other places gwithin easy reach where iron ores occur together with cheap fuel. I have seen, on former journeys, places of this kind in southern Shantung, close to the Grand Canal, where deposits of iron ore more valuable than those of the Nanking Hills, but, like these, not at all exploited, occur in immediate vicinity to coal mines furnishing cheap and tolerably good fuel. Those places alone would be sufficient to prevent any iron industry near Nanking from taking large proportions.

Marble of Kao-tse.—In several places in the Nanking Hills, the limestone beds are converted into marble. The best known among them is, the hills south of Kao-tse, ten miles south-west of Chinkiang. A small affluent of the Yangtse breaks through them in this place, dividing them into an eastern portion, the Ma-shan, and a western portion, the Siang-shan. Boats can go up to the gap between both. Extensive quarries have been oppened on either side of the shipping place. Former generations have used the marble for monumental buildings, for instance in the temple on the Hwa shan. But the chief use to which the large quantities are put which are quarried and exported at present, is said to be, to serve, in the state of finely ground powder, for the adulteration of rice, to which a white colour is given. The facts, that people are unanimous in this statement, and that nearly all the marble goes to the Grand Canal, north of the Yangtse, are suggestive of one of the methods applied to make up the losses in weight which, by means of different kinds, the large quantities of rice going north for the government may suffer on their long journey,

The marble is coarse grained, but takes a good polish, and resists well the influence of the atmosphere. The common varieties are white, with black designs; but in close vicinity to the dykes of dioritic porphyry, the marble is perfectly white. Geologically, the marble of Kaotse corresponds to the bed of Si-hia limestone. The chertnodules render a large portion of the rocks useless for

practical purposes; it is only the pure black and bituminous limestone that has furnished the even-grained and pure marble.

III. *Kitao limestone and Kitao coal-formation.*—

As we ascend from the most ancient formations to those more recent in origin, the local differences of stratigraphical development increase. Although the rocks which we have now to consider were deposited during a portion of that epoch which gave origin to most Chinese coalfields, it would be a rash generalization were we to unite the strata of all Chinese coalfields under the denomination of "the Chinese coal-measures." The comparison of the mode of development in different local ties is quite an intricate subject; and I apply for this reason a local denomination, under which are to be united the coal-bearing strata in many places on the Yangtse. Fortunately, nearly every coalfield in China that I have visited is rich in fossils. I have made considerable collections of them, and hope they will suffice to throw light on the relative age of the strata from which they are taken. They appear to disclose the important fact, that most of the coalfields of China were formed in the carboniferous epoch and, therefore, coincide in age with all the most important coalfields of Europe and the United States. Another conclusion based on the nature of the fossil remains is this, that nearly all Chinese coalbeds were deposited at the bottom of the sea. In various localities I have found sea shells in the underlying or overlying strata, or in those which intervene between the coalbeds. If I am allowed to draw any further conclusion in a general way, I may pronounce it as the most probable result from the examination of the fossils, that the conditions for the formation of coalbeds continued in China during long periods, and during that time shifted from region to region, returning not unfrequently to places where they had been reigning before. For the cause of these fluctuations, we have to look to the oscillations of the soil, which were then more frequent in Eastern China than they were before or have been since; they were due to the action of the same subterranean forces which, in that period, gave rise to the profuse emission of porphyric rocks. The geographical range of these, in China, is greater than in any explored country of the globe.

Ki-tao, (鷄頭) or "Cock's head," is a large limestone bluff on the Yangtse, halfway between Hankow and Kiukiang. Enclosed between the limestone is a bed of coal, which occurs under peculiar conditions and, on account of the hardness of the overlying rocks, has been better protected from destruction than other coalbeds at higher levels, which did not enjoy that advantage. To this formation belong the two remaining coalfields of the Nanking Hills, to the description of which I will immediately proceed.

Coalmines of Chu-sze-kang (竹寺崗)—In following upwards the small rivulet which passes the marble quarries of Kao-tse, you come first into a wide valley, four miles in extent from north to south, and mostly covered by Loess. It is closed to the west by granite hills of gentle outlines, which intervene between the front range and another range south of the valley. This range is divided in two by the same river; the western and higher summit is known as the *Kaoli-shan*, (高里山), the eastern as the *Chu-shan* (竹山). These two hills, together with another summit the *Lun-shan* (崙山), west of the Kaoli-shan, are exceedingly interesting in a geological way, as they exhibit very clearly the coal-formation of this region, in a beautiful section embracing the three hills.*—Leaving out of consideration the Lunshan, the lowest strata are:

(1.) Quartzose sandstones, varying in grain and colour; yellow, brown and whitish colours prevail. They constitute the rugged summit of the Kaoli-shan, and have here the thickness of about 1,200 feet. Their strike is W.S.W. and E.N.E., their dip 35 to 40 degrees S.S.E. Conformably on them resteth

(2.) Lower Kitao-limestone, which is regularly stratified, of grey, reddish, and whitish colours, and carries many chertnodules, chiefly in certain layers. It contains fossils. At two separate levels, which are, respectively, about 400 feet and 1,000 feet above the base of the limestone, it encloses beds of calcareous sandstone through which is disseminated a great quantity of flint. The

* I avail myself of this opportunity, to recommend the study of the profile of the Lun-shan and Kaoli-shan to any geologist who may visit this region. I could not devote sufficient time to it, to get at the complete idea of series strata. The Lung-shan limestone, which lies considerably below the lowest strata above described, is a formation rarely met with in these regions, and contains many fossils, among them *trilobites*, and large specimens of *orthoceras*. The whole vicinity of Chinkiang is rich in fossils, and will yield a good harvest to any one who may undertake to collect them.

two beds are marked, on the surface of the ground, by lines of old shafts, which served the purpose of mining flint. The upper bed is again covered by a few hundred feet of limestone, which makes its total thickness, including the flint-bearing strata, about 1,500 feet. Next follow:

(3.) Coalbearing strata. These lie conformably on the limestone, having a strike from W.S.W. to E.N.E., and dipping 31 degrees S.S.E. They constitute rolling hills, south of the Chu-shan, and are at least 500 feet thick. The cover of vegetation conceals partly the nature of the strata. They commence with fine grained sandy shales and lydite of black colour, which are full of flint and well preserved fossils. This is the first locality where a large quantity of determinable animal fossils were found in situ, in China. Having collected them in February 1869, I was then able to infer, that at least the Ki-tao coalmeasures are a representative of the true Carboniferous of Europe. Corals, brachiopods, bivalves are frequent among the fossils, and represented by a great number of species. These strata are overlain by brown sandstone and light-coloured argillite. A little farther on, follow black shales imbedded between the sandstone. Their outcroppings can be followed by a line of old coalmines, close to a small hamlet and temple called Chu-sze-kang. The present inhabitants express by the vague term of "a thousand years ago," that no record is left of the time when these coalmines were worked. At a short distance farther south, and overlying conformably the coalbearing strata, follows:

(4). Upper Ki-tao limestone, visible in several low hills which rise out of the Loess. Its thickness cannot be established. A few hills consisting of porphyry are the last slight elevations in going south; then follows Loess and alluvial soil.

It is perfectly impossible, from what can be seen at present, to form a positive opinion regarding the value of this coalfield. But probabilities are not in its favour. Firstly, it is certain that only one coalbed has been worked, and it is therefore not probable, that more than one does exist. Then, the large quantity of shale thrown out in mining justifies the conclusion, that that one bed is of little thickness. Still, as the situation of the place and the position of the coalbed, for working, are favourable, the Chinese authorities would do well to examine the coalbed by borings. The underlying limestone forms a semi-circular basin which limits the range of exploration and future exploitation, to a small extent. Besides, the occurrence of the porphyry makes is probable, that, in going south, the position of the coalbed will be found disturbed.

Coal mines of the Lung-shan (龍山).—While the coal mines of Chu-sze-kang are situated on the southern side of the Nanking Hills, those of the Lung-shan are on the northern side, at a direct distance of about twenty miles from the former, and separated from them by the Hwa-shan range and its eastern prolongation. The Lung-shan is a range of hills of from 500 to 800 feet altitude and eight miles in length. It trends west and east, and halfway turns to E.S.E. Its western portion is the only place in the Nanking Hills where the alluvial plain of the Yangtse reaches to the foot of the hills, without any terrace of Loess intervening. Here, where a narrow passage opens through the hills, the small village of *Lung-tan* (龍潭) is situated, by which the coalfield is more generally known. It is situated twenty-eight miles west of Chinkiang and is accessible by boats, at high water. The strata of which the Lung-shan is made up participate in its strike, and dip to the south. The northern slope, which faces the Yangtse, is a straight wall exposing the broken-off ends of the strata; but on the opposite side the range descends in gentle slopes. I visited only the western half of the Lung-shan. The sequence of formations is there as follows:—

(1). Quartzose sandstone, partly converted into quartzite. Its upper portion, only some three or four hundred feet in thickness, is exposed above the plain. But in going east, the thickness increases.

(2). Lower Kitao-limestone. It contains few chertnodules, and is only about 350 or 400 feet thick.

(3). Sandstone and shales; the former are soft and brown, the latter mostly of variegated but light colours. They cause, on the surface of the ground, a deep depression between the hills made up of (2) and (4). Within this depression are situated the black dumps of a number of abandoned coalmines, which were worked till six or seven years ago, but are now completely caved in. The coal is accompanied by a little black shale and, together with this, enclosed between strata of soft brown sandstone, which have a strike from west to east, and dip 48 degrees south. The thickness of this entire system is about 500 feet.

(4.) Limestone, with some thin argillaceous beds. It is, apparently, at least 1,500 feet in thickness.

The eastern half of the Lung-shan appears to be similarly constituted, but I did not hear of any coalmines having been worked outside of the trough described under (3), which is situated within a mile from Lung-tan.

The similarity of this order of succession with that of Chu-sze-kang, as well as the points of difference between both, are conspicuous at a glance. Although the main features are the same in both cases, the differences in details are great enough to render it unsafe to apply the experiences gained in one of the two localities, in regard to the coal, directly upon the other.

The kind of coal that was extracted from these mines can still be seen in numerous fragments lying loose on the dumps. It is a dry coal, burning without flame or smoke, and leaving very little fine white ash; it has a greyish black colour and dull lustre, which gives it the appearance, as it were, of condensed coke, and reminds one of a kind of anthracite which is mined on an island near Kiu-shiu, in Japan, and is much valued by the natives. Although that Lung-tan coal which is now to be got on the dumps may have lost its bitumen by exposure, it is not improbable that it is originally true anthracite. It is even now hard and solid, and could probably be mined in large lumps. Perhaps there are two seams of coal. At least, a line of very ancient works can be traced, which appear to have been established on a coalbed at a lower level than that which was worked last. Judging from the great quantity of waste rock thrown out, I believe that the thickness of the latter seam is not over two feet.

This coalbed is probably the most valuable of those known in the Nanking Hills. Its position is favourable for working, the coal probably of good quality, and the proximity of a canal allows its cheap shipping. It would be easy to establish the extent and value of coal-bearing ground by a detailed survey and a few borings. Dislocations of the coalbed will probably be found to exist; but the regular structure of the Lung-shan range justifies the expectation, that coal will be met through the whole length of the range, from Lung-tan to the neighbourhood of Sha-su-kai. The villagers state, that the authorities do not allow the reopening of the mines. But as otherwise all my endeavours failed to get out of them a single veracious statement in regard to the coal, and as I have never met in any part of China with a statement to that effect, excepting at Lung-tan and Pa-kwei-miao, I am not inclined to trust to it, and rather suspect that the people re-echo what they have heard expressed from prejudiced foreigners; moreover as they pointed to the disturbance of the Fung-sui as being a plausible reason for the prevention of mining. The mandarins are well aware that, though those who pay for mining enterprises may fail, they, themselves, can only gain. In all mining districts which I have visited, they have acted in accordance with this principle, and I never met with any instance where the Fung-sui superstition did interfere with the extraction of minerals, provided it could be done with profit.

Coal-fields of Ning-kwo-fu in Ngan-hwei.—I owe to Mr. Pumpelly's valuable table the statement, that Chinese books mention the existence of coal in every *hien* of the department of Ning-kwo. I directed accordingly my attention upon the subject when I passed through the country. Ningkwo-fu is situated 75 miles due south of Nanking. I visited three districts, and found that the report has a foundation, although the occurrence of coal is quite limited in extent.

I noticed in another page, that the rocks of the Peking-system form two broad bands; one of which extends, in width, from Fan-sui-hien in Chekiang to Ning-kwo-hien, while the other accompanies the southern bank of the Yangtse, and that between the two is enclosed a band of rocks of more recent origin, among which are coalbearing strata. These are distributed in two narrow belts. Going northwest from Ning-kwo-hien, we pass through

(1.) about 3,000 feet of sandstone, of red, brown and yellow colours, and of varying grain. They constitute a number of long narrow ridges, all trending S.W. and N.E. and are imediately followed by:

(2)—Lower (Ki-tao) limestone.

(3)—Sandy shales with coal, about 300 feet thick.

(4)—Upper (Ki-tao) limestone.

All the strata dip north-west. The Ning-kwo river breaks at right angles through the ridges made up of (1), and enters then the longitudinal valley of Sui-tung-chin (水東鎮), in which the strata of (2), (3), and (4) are beautifully exposed. The coalmines were all abandoned long

ago. Old inhabitants can recollect the time when they were worked. The coal is said to have been of inferior quality, and only used for burning lime. Each mine was worked to a little depth, until the water interfered, when another was opened. And when no more coalbearing strata were exposed to view, wood was used for burning lime.

I do not know, how far this coalbearing system continues southwest or northwest. It is separated from another coalbelt northwest, partly by broad valleys, and partly by a high range, the composition of which I am not acquainted with. The best known place in the northwestern belt is *Kiu-li-twan*, (九里團) 25 miles southwest of Ning-kwo-fu, and in the district of Siuen-ching(宣城). Here the upper Ki-tao-limestone is overlain by:

(5.) Coalmeasures of Kiu-li-twan, a system of sandstones and shales exposed in the thickness of 500 feet, without any overlying strata being visible.

These coalmines are famous in the country, and are said to have yielded large amounts of coal, and large profits to the owners, before the rebellion. Lack of skill in mining, and the scarcity of labour in the country, were pleaded as the reasons why the mines are not yet re-opened. Just when I visited the place, however, some immigrants from Hunan set to work to re-open one of them. The coal strata strike W.S.W.—E.N.E., and dip 20 to 25 degrees N.N.W. The mines, which are scattered over an extent of five miles, consist of vertical shafts sunk through the overlying sandstone to depths not exceeding 100 feet. Water is said to have been extremely troublesome, and to have raised the price of the coal to a high figure. The coal-bed was reported to me to be of irregular thickness, and to exceed six foot in some places. The coal was mined, partly, in large lumps, and is said to have burnt with scarcely any flame or smoke. In the whole vicinity I found, up to this day, small clay stoves in use which are built for a very strong draft of air.

Kiu-li-twan should be revisited in some time, when the re-opening of the mines shall have progressed. The value of these will, however, not only depend upon the quality of the coal, but also upon the length of coal-bearing ground that can be opened. It is an unfortunate circumstance, not only here but in many places in China, that, however much the older formations take part in the structure of the surface, the better portion of the coal-bearing strata gets only a small share of it. When they are not protected by a hard cover of limestone, as in the case of the Kitao coalbed they have been carried away by denudation, and small fragments only are left here and there. This is the case in the department of Ning-kwo. Just where (in coming from the south) this apparently valuable coal-formation first makes its appearance, the encroachment, from the north, of the valleys upon the hills, is such as to bury deep beneath the later sediments all that may be left of the coal-formation, with the exception of a few isolated places. One of these is near Kiu-li-twan. Another is said to be fifty miles south-west of that village, and twenty miles southwest of King-hien. This is even a more celebrated place than Kiu-li-twan, and is said to have yielded the best coal of the province.

If the coal should be really of so good a quality as people say, then the reopening of the mines may be attended with success. They are situated fifteen miles from the King-river, where, at the mart of Ma-tao-chin, (馬豆鎮) the coal could be put on boats. This place is 60 miles from Wu-hu.

These three localities: the valley of Suitung-chin, the environs of Kiu-li-twan, and the mines twenty miles southwest of King-hien, are the only coal-mining regions I know of in the province of Ngan-hwei.

Coal-mines on the Yangtse, above Kiukiang.—Between Kiukiang and Hwang-chau-fu, the Kitao-formation attains an extraordinary development, vertically as well as horizontally. It forms several folds, with a general strike from W. S. W. to E. N. E. The Yangtse breaks through them at right angles, and exposes the stratification in fine sections. They are made up everywhere of the lower limestone and the upper limestone, with a bed of dark sandstone and silicious shales between both. This bed is about 100 feet thick and encloses one coal-seam. Considering that the limestone has an aggregate thickness of at least 2,400 feet, it is at once conspicuous, how unfavourable a development of carboniferous strata this is. Yet, that coalseam has been worked extensively; and its conspicuous position, which renders it, in some places, recognizable from on board of the steamer, has caused a good deal of attention to be directed upon it. From Split Hill to

Shi-hwui-yau, nearly every hill, or at least every group of hills, exhibits the coalseam, and some abandoned mining works on it. From what I could learn by the defective evidence now at command, it appears that it is very thin, varying from 12 to 24 inches, and that the coal is of too inferior quality to be able to compete with that from Hunan, and, lower down the river, with that from Loping. At those few mines which are still being worked, very small quantities of coal are got, and that is exclusively used for burning lime. Nothing of it is shipped down the river, because Hunan coal is purchased in preference.

There are, however, some coalseams, of apparently greater value, imbedded in strata which overlie the Kitao-limestone. But, similarly to the case just described in Ngan-hwui, their range of occurrence is very restricted. I know them only near Hwang-shi-kang, about sixty miles below Hankow, where they occupy a limited space and have been worked in former times.

The coalmines of Loping, east of the Po-yang-lake, are the best of all known in the vicinity of the Yangtse, below the Tungting lake. The formation to which they belong is more recent in age than the Kitao-limestone. I collected there a great number of exquisitely preserved fossils. They will allow the precise determination of the geological position of this coalbed to the others on the Yangtse.

Although these short remarks on the coal- mines on the lower Yangtse do only convey my personal opinion, they may go to show, that there is indeed not much reason to look forward for a field of great mining enterprises in these regions, nor for any prolific source of supply of a cheap and good fuel for Shanghai. The fact that the Kitao limestone, with its single coalbed of little thickness, has escaped destruction in a much superior degree to the coal-bearing strata of later origin, which, while probably much more valuable, are left only in a few places of little extent, explains one of the chief causes of these unfavourable circumstances. In northern China, the stratigraphical disturbances have been generally much less than on the Yangtse; and large sections of the coal measures, though built up mainly of soft and easily destructible sandstones, have there escaped denudation, and are left as coalfields of incalculable value. The only region on the Lower Yangtse which, on examination, may still disclose some coalfields of value in some remote basins, is the province of Kiangsi. The geological position of the small coalbasin of Loping makes it not improbable, that in the recesses between the hills surrounding Poyang-lake similar deposits will hereafter be found.

Reverting once more to the coalfields of the Nanking Hills, their position in the vicinity of the greatest market for coal, Shanghai, makes it probable that small mines may be worked there profitably for some time. The Lung-shan contains probably the most valuable and extensive coalbed. Chusze-kang is a small basin which, in the best case, will give rise to mining on a small scale and of short duration. And at Pakwei-miao and the Chung-shan, there are prospects of finding the coalbed of the Nanking series in places more favourably situated than that in which it was worked before. But in each of these cases, the singleness and small size of the coalbed will never allow the profitable establishment of mining works on a large scale, and no yield can be expected from these sources in any way proportionate to the supply of a market such as Shanghai.

IV.—The Tatung Strata.

In the Nanking Hills, the next sediments following in age above the Kitao-limestone, are stratified conglomorates of unknown age, occurring near Nanking. I observed the same formation first near Tatung on the Yangtse, where it composes low hills along the river, broken off in conspicuous walls with very distinct stratification. In my last letter, I had occasion to mention the part it takes in the surface geology of Ngan-hwui; and it has a similar range of distribution throughout the rest of the valley of the lower Yangtse.

The Tatung strata are coarse conglomerates, sometimes interchanging with indurated pebbly and sandy beds. The matrix of the conglomerates is sandy, and mostly of red or brown colours. The strata lean always on mountain ranges of previous origin, and were deposited after these had acquired their present general disposition. They are inclined at angles varying from 12 to 20 degrees, and dip in every instance from the hills into the adjoining alluvial basins. On the top they are cut off at a level, so as to form a terrace which attains an elevation of

from 80 to 120 feet above the alluvial plains, and has an undulating surface. The valleys are cut into them with steep faces on either side. I walked repeatedly, in Ngan-hwei, several miles on the top of the Ta-tung terrace, at right angles with the line of strike, and never found an interruption, never a marked change in the dip, never any folding of the strata, and never any material change in the character of the rocks. Minor changes are frequent. Where the formation adjoins limestone hills, the fragments of rock in the conglomerate are limestone; and where the next hills are quartzite, the conglomerate is made up of large pebbles of quartzite. Farther off from the foot of the hills, there is generally a mixture of rounded fragments of sandstone and quartzite.

The mode of origin of this formation is probably different from that of nearly all other sedimentary rocks. These are commonly supposed to have first been deposited horizontally, and to have been brought into their inclined positions by elevation. If such had been the case with the Ta-tung strata, they must have formerly consisted of horizontal deposits miles in thickness, and yet made up throughout of nearly nothing but conglomerates. The present position of the strata, dipping only at certain low angles, off from pre-existing declivities, and therefore in various directions, could only be explained by assuming a most singular and unheard-of mode of action of elevatory forces. And how could it be explained, that these formations do only occur on the boundaries of the plain, and do not cover the hills, or portions of them? and how, that the terraces made up of them do not rise to an altitude exceeding about 120 feet? It is eminently probable, that the Ta-tung strata were originally deposited in their present position, and contain the record of a period of powerful denudation; that they were deposited at an epoch when the country had attained its general configuration, when the present mountain ranges were higher than they are now, and the present alluvial valleys were deep basins and depressions, bounded by steep slopes. If the sea filled these depressions, at a slightly higher level than it is now, the torrents descending from the surrounding mountains would carry down the rocky debris and, on reaching the sea, pour them down the steep slope, so as to form inclined layers. These would grow in extent, in a similar manner to that in which the dump pile of a mine grows, the top extending horizontally, while the sides are covered more and more by parallel layers. Deposits of this kind, on a comparatively small scale, have been observed to be formed at present at the upper ends of the lakes of Switzerland, for instance of that of Geneva. I have mentioned in another place, that the deposition of coal-bearing strata in certain parts of China was accompanied by the eruption of porphyries in others, and by great changes in the configuration of the surface. The eruptive action continued during long periods, first submarine, then on terra firma. To these outbreaks and to events connected with them may be due the extraordinary and violent denudation which gave rise to the deposition of inclined layers of very coarse sediments thousands of feet in thickness.

Subsequently to this period, China was raised out of the sea, and the terrace of Ta-tung strata destroyed in great part, and cut up, by the same rivers which had before carried the material of which they are composed from the hills to the sea. During the long period of subsidence which has been prevailing since then, the great basins were gradually filled up with the alluvial deposits that gave origin to the valleys of the Yangtse and other rivers, and extend far out into the sea, and which are now again slowly rising out of it.

I will not enter now into the description of formations subsequent in origin to the Ta-tung strata, such as the Loess and alluvium. They complete the series of those which take part in the structure of the region of Nanking and Chinkiang, but envelope only, and surround on all sides, the hills which are the subject of this letter.

In conclusion, I beg to express my regret, that I do not accompany this letter with a map, as it would contribute considerably to the easier understanding of the subject of these pages. I have constructed, on my own surveys, a tolerably accurate topographical and geological map of the region of Nanking and Chinkiang, but could not find the time to give it that completeness in execution which it would require to be adapted for presentation to you.

I have the honour to be, Gentlemen,

Your most obedient. servant.,

F. RICHTHOFEN.

No. VI.

Amherst College

LETTER

BY

from BARON VON RICHTHOFEN,

FROM SI-NGAN-FU,

ON THE

REBELLION IN KANSU AND SHENSI.

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LETTER FROM BARON VON RICHTHOFEN.

SI-NGAN-FU, PROVINCE OF SHENSI, Jan. 12th, 1872.

WALTER PEARSON, ESQ.,

Secretary of Committee of General Chamber of Commerce, Shanghai.

DEAR SIR,

I reached this place a week ago. I find that the Catholic Missionaries are in regular communication with Hankow, and make use of their kind services in forwarding you this note. It is mainly intended for keeping you posted in regard to my whereabouts, as I have not the leisure at present for detailed communications.

I left *Peking* on October 25th, and made immediately for the high hills which border the plain to the west. After visiting some of the coal districts from which the capital is supplied, I went by an exceedingly mountainous but very interesting route to *Pau-ngau-chau*, and proceeded to *Siuen-hwa-fu* and *Kalgan*. I spent a fortnight beyond the Great Wall, making a delightful trip through southern Mongolia, in the execution of which I was much assisted by the hospitality and civility of the gentlemen of the Belgian Catholic Mission; one of them gave me the pleasure of his company on the whole way, and went with me as far as *Ta-tung-fu* in northern Shansi. Another fortnight was devoted to the journey from *Ta-tung-fu* to *Tai-yuen-fu*, when I visited the *Wu-tai-shan*, one of the sacred mountains of China, with summits of ten thousand feet altitude. This was in the first days of December, and the weather intensely cold.

It was my intention to go from Tai-yuen-fu westward into Shensi, and to explore the totally unknown northern portion of that province. But I was obliged to give up that plan, those districts being devastated and much depopulated by the Mahomedan rebels, some of whom are said to be still in the hills, and to make travelling unsafe. I found it quite impossible to hire men or animals for that trip, and had therefore to follow the great high-road which leads by way of *Ping-yang-fu* and the *Tung-kwan* gate to *Si-ngan-fu*.

I am struck with the greatness and importance, politically as well as commercially, of this city, which, after the partial destruction of Nanking, Wu-chang and Hangchau, is probably the second in size in the Empire. Its magnificent walls have completely protected it from destruction by the rebels. I hope to give you some data of interest in regard to it, on my return.

To my great regret, I must leave the exploration of the province of Kansu to some future traveller. That country is in a very unsatisfactory condition, the Mahomedan rebels holding a portion of it, and making travelling in the rest of it troublesome and unsafe. The villages are deserted and destroyed; the two high-roads to Lan-chau-fu filled with soldiers, of whose propensity for stealing I have had personal experience, besides having been warned of them by their own officers. There is still a good deal of travelling done between Si-ngan-fu and Lan-chau-fu, chiefly by merchants. They go in large bodies, choosing little known byeways through the hills, and are still subjected to much danger and annoyance, besides using a great deal of time. The hardships of such a trip, and the length of time which it would require, would hardly be commensurate with the result that I could expect to arrive at under the present circumstances. I would, moreover, not be able to go beyond Lan-chau-fu; and as no road exists between Kansu and Szechuen, I would have to return to Shensi in order to go south.

In regard to the province of Kansu, I must therefore confine myself to collecting data from other persons, and will proceed from here directly to Szechuen.

The weather is very favourable for travelling in the present season. It was cold while I was in Mongolia and Shansi; but the temperature is pleasant in this portion of Shensi. Snow fell only three times since I left Peking, but never more than one or two inches. The whole journey was made on horseback, with Mongolian ponies.

As some notes respecting the Mahomedan rebellion may be of immediate interest in Shanghai, I will communicate to you already now what I could learn in regard to it. The information is collected from many and varied sources.

The year 1861 is stated as the time when the rebellion commenced. It is emphatically and positively asserted, by persons who are in the position to be well informed, that the first move was made in this province of Shensi, and that the province of Kansu and the distant regions of Turkestan and Ili followed afterwards, one by one, the Mahomedans there being encouraged by the example set by their co-religionists in Shensi. It is for this reason, that they had such easy work in the far west, in killing the Chinese and making themselves independent.

Not much of a definite character can be ascertained in regard to the immediate causes of the rebellion. Those of a more remote character date far back in history. Since the time when, under the Tang dynasty, the Mahomedan *Uïgur* (pronounced *Hwei* or *Hwei-hwei* by the Chinese) were called from their pasture grounds situated beyond the Great Wall, west of

Ning-hia-fu, to aid the Chinese against the invasion of the Tibetans from Kokonōr, these people took a firm footing on the territory of China proper, and spread gradually over the north-western provinces. Although those of Shensi and Kansu wear the queue and speak Chinese, they are considered by the pagans as a different people; and this view is corroborated by their features, which differ from those of the Chinese proper. The pagans generally use here, for themselves the well known term "Han-jin," to mark their distinction from the Mahomedans. These, including the numerous converts of purely Chinese origin, are called *Hwei-hwei*, and since they are in rebellion, *Hwei-fei*. The contempt in which the Mahomedans hold the pork-eating Han-jin, and the aversion which these have against people living among them and having manners and customs so different from their own as even to preclude intermarriage, has created since ancient times much ill-feeling between the adherents of the two religions, and it has much increased within the last decades. The Mahomedans, who, in general, prospered well, and are a more vigorous and energetic race than the Han-jin, grew proud and overbearing, while these had an advantage by their greatly superior numbers. Acts of violence became more and more frequent. The mutual ill-feeling increased when, in 1860, the Taiping rebels made a first, though very short, invasion in the province of Shensi. The pagan inhabitants repulsed it, and accuse the Mahomedans of not having assisted them, but of rather having embraced the cause of the invaders. The Mahomedans, in their turn, accuse the pagans, that they propagated inflammatory addresses throughout the province, inciting the population to the annihilation of all Mahomedans. Matters had indeed come to such a pitch, that the only remaining question was this, which of the two parties would commence hostilities. The initiative rested with those who were most energetic, that is, the Mahomedans. The first move of that rebellion, which afterwards spread through the whole of Central Asia and became so disastrous for the Chinese Empire, appears to have been, the rising of the Mahomedans residing in the city of *Hwa-chau*, situated on the high-road, 180 *li* east of Si-ngan-fu, now totally destroyed. Thence the rebellion spread from place to place, and gradually over the whole province of Shensi. It never had any head or leader, and the only tie uniting the different bands of rebels was the vague intention to exterminate all the pagans in the province, and to make themselves sole possessors of it. The life and property of the Christians, of whom there are now about 20,000 in the province, were spared. But the pagans were cut down wherever met with; men, women and children alike. Those who lived in the neighbourhood of hills took refuge in them and, in many instances, spent years in retirement; but in the plains, where no place of refuge offered, the massacre was terrible. The ease with which the Mahomedans, though much inferior in number, overpowered their timorous game, is remarkable. Eye-witnesses say that whole villages were deserted on the approach of a few rebels. The ravages committed by these from 1861 to 1870 are fearful, nearly every village and town being completely destroyed. They were roving about the country in large bands; nearly every year they remained for some time on the high-road between the Tungkwan gate and Si-ngan-fu, rendering all intercourse impossible. Happily, they had no guns. This circumstance saved some of the larger walled cities, among them Si-ngan-fu. The Mahomedans of this place, estimated at fifty thousand, were from the beginning forbidden to leave the city, under penalty of death, and this restriction is severely enforced upon them until this day. Their overbearing manners of former time are said to have given way to great humility. The pagan population of the city, estimated at about one million, is very desirous of killing them all, and only prevented from doing so by the mandarins.

The first General sent by the Chinese Government against the rebels was To-ta-jin, said to have been an energetic but cruel soldier. But all the success which he had with the few troops at his command was, to repel the rebels, from 1861 to 1866, gradually from the eastern frontier of the province of Shensi to beyond Si-ngan-fu. This was accomplished with great loss of men among his own troops. All the Mahomedans whom To got hold of, women and children included, were killed. The rivers are said to have been coloured red with blood, at that time. It appears that the Chinese Government did not take the matter seriously in hand, as long as there were Taiping and Nien-fei rebels to fight against; but, after having sent an insufficient army into Shensi, contented itself with protecting the passages across the Hwang-ho, leading into Shansi.

In 1866, To was killed in battle, and Tso-kung-pau was appointed in his place Governor-General of Kansu and Shensi, and Commander-in-chief of the troops stationed in the two provinces, with the express order to reside in Kansu. The career of this General in former years is well known. He distinguished himself in fighting the Tai-ping and Nienfei. But his career in the war against the Hwei-fei is marked by an almost complete want of success. The rebels immediately regained possession of the districts which it had cost his predecessor so much time to take, and at no time before had the devastations made by the rebels in Kansu and Shensi been so great as they were in the years following the accession of Tso-kung-pau. On the whole road from Tung-kwan to this place, the years from 1867 to the spring of 1870 were described to me as those in which the suffering was greatest. Si-ngan-fu was then completely surrounded with rebels during two years, and many people in the city died from starvation. Battles were lost, regiments decimated, and no success gained.

It was in this emergency that, as you will recollect, Li-hung-chang got the order, in the spring of 1870, to fight the rebels in Shensi and Kansu. He marched from Wu-chang-fu up the Han river, and entered Shensi with his forty battalions, of the nominal strength of five hundred men each (as is every other battalion which I shall have to mention.) All of these were provided with foreign arms, some of them drilled by foreign officers, and practised in warfare. But scarcely had General Li reached his place of destination, when he was called to the province of Chili, after the massacre of Tientsin. He left his troops in Shensi, and gave the command of them to General Liu, who has held it since then. The fame of Li-hung-chang (or, perhaps, of his foreign arms) is so great, that the rebels withdrew immediately on the

approach of his troops, never engaging in a fight with them. No one of the soldiers of that army whom I met has ever seen a rebel. The whole province of Shensi was at once cleared of organized rebels, without bloodshed, none but stragglers remaining. The main body retired into Kansu, where they were received by their coreligionists, although these are said not to be in complete harmony with the Mahomedans of Shensi.

Since the spring of 1870, peace may therefore be said to be comparatively restored in Shensi, though a state of complete safety is not quite re-established, chiefly in the hilly districts of Yen-ngan-fu and Yü-lin-fu. The remnants of the population have left their hiding places in the hills and returned to their villages, many of which have been rapidly rebuilt. The province will remain in a peaceful condition as long as it is occupied by foreign armed troops.

Proceeding now to the province of Kansu, which is the present theatre of war, I must first state the astonishing fact that General Liu did not follow up his enormous advantage, but contented himself, during the last eighteen months, with guarding the frontier of Shensi towards the Kansu side. He left all the fighting in Kansu to Tso-kung-pau, with whom he was evidently not on terms of harmony; and though second in military rank to him, he never assisted him in the severe struggles which the army of Tso had to undergo, sometimes in his close vicinity. Tso-kung-pau is said to have the immediate command of about two hundred battalions, or about one hundred thousand men, nominally (not counting Liu's troops), which are nearly all in Kansu. It appears that Tso-kung-pau, although no go-ahead-man, and lacking energy, is a cautious and prudent general, and that his want of success is due to the fact that his troops are much inferior in fighting capacity to those of Li-hung-chang, and were originally badly armed. In the course of time they have received a great many foreign arms; but most of these are said to have been taken by the rebels, Tso's troops not being accustomed to their use. A new supply was sent a short time ago to Kansu, but the rebels caught the whole train, killed the escort and took possession of the arms and ammunition.

Although Tso-kung-pau was defeated in many battles (so called) and his ranks are much thinned, he has had one signal success. The Mahomedans had, from of old, two strongholds in Kansu. The first of these was *Kin-ki-pu*, situated on the right bank of the Yellow River, about 100 *li* due south of Ning-hia-fu, and at the same distance from the Great Wall. This place is said to have been occupied by the Mahomedans for more than a thousand years. After they had gained there a firm footing, they settled in the much stronger place *Ho-chau*, about 200 *li* southwest of Lan-chau-fu, the capital of the province. It is situated amidst high and rugged mountains, and can only be approached by narrow footpaths leading through rocky defiles. Ho-chau is known, even in Europe, as the place which has been, since centuries, the hotbed of all Mahomedan anti-Chinese machinations. Now, Kin-ki-pu was taken, about April 1871, by the Imperial troops under Tso-kung-pau, and the rebels repulsed beyond the Yellow River. Since then, Kansu is cleared of organized rebel troops east of the Hwang-ho, with the exception of the city of Ho-chau and its environs. On the left bank of the Hwang-ho, the Imperialists hold the two cities of Lan-chau-fu and Ning-hia-fu, but no territory beyond them. All efforts should now be concentrated towards the capture of Ho-chau, which is the key to the suppression of the rebellion. It appears that, if that city were taken, the Imperialists would easily regain possession of that narrow but most important strip of land, which stretches north-westward from Kansu, between the mountains of Kokonor to the south and the Great Wall to the north, and which embraces the three cities of Liang-tshau, Kan-shan and Su-chau.

This too is, as I learn, the present plan of operations. Tso-kung-pau has his head-quarters in Ngan-ting-hien, about 200 *li* southeast of Lan-chau-fu, and intends to operate against Ho-chau. But, to judge by the slowness of his movements, he is fully aware of the difficulty of his task, as he has to fight the combined Mahomedan forces of Shensi and Kansu. It is not known, here, whether these have now any chief. They are, however, much feared by the Imperial troops, and are said to have excellent horses, to be good horsemen and good marksmen, very valorous and ready to fight, never afraid of death. They burn all prisoners of war, while the Chinese shoot those they get into their hands.

The precedents of the army of Kansu would not warrant any sanguine expectations regarding the early capture of Ho-chau and the termination of the war. But, fortunately, there has been a change in the command of Li-hung-chang's army. When I reached Hwa-chau, on my way from Tung-kwan to Si-ngan-fu, I met General Liu, who returned with a portion (18 battalions) of his troops, bound for Chou-kia-kou in Chihli (situated on the Wei river, not far from Wei-hwei-fu), whence he is to march to Tientsin in the third Chinese month. He has been replaced in command by Tsau-chu-men of Tientsin, who, coming from the east, arrived in Hwa-chau on the same day, and received from Liu the official seal as commander of all those of Li-hung-chang's troops which remain in Shensi (22 battalions, as I learn). Tsau is now in Si-ngan-fu, and will start for the seat of war after Chinese new year. Although he is inferior in rank to Tso-kung-pau, I could not learn whether he is also second in command to him, and is to assist that general in his operations. It appears, rather, that he will act independently, Li not being desirous of putting his pet troops under the command of an officer co-ordinate in rank with himself. Notwithstanding this apparent unfortunate conflict, some more action than heretofore may be expected, because foreign armed and drilled troops will actually march into Kansu. The military and civil mandarins with the army of Tsau are already preparing here for the journey to Su-chau.

Su-chau, as a glance on the map will show you, is the furthest place in China proper, and only 100 *li* distant from the *Kia-yu-kwan*, the last gate in the wall, which terminates there. This gate, which, before the rebellion, was kept locked, and was expressly opened for every traveller, is actually the door of the Chinese Empire in that direction. The Chinese will endeavour to re-extend their dominion at least to this point. And I am confident that they will succeed before long, because the Mahomedans are diminishing in number and cannot get any assistance, while the Imperialists can increase their forces. An increase in numbers alone

would probably be of little avail to them; but they strengthen the efficiency of their army by adding foreign-armed troops, which have already done the miracle of clearing Shensi without one gunshot. If the Imperialists should succeed, and peace be re-established in these two provinces, after they have been allowed, by gross negligence, to suffer immensely during an entire decade, they will owe it mainly to foreign arms and foreign drill. I have visited an arsenal in this city, where a considerable quantity of ammunition for foreign arms is made, by men from Ningpo who have had their course of instruction in the arsenals of Shanghai and Nanking. The lead even of which they cast their bullets has English brands. There is also a French officer, General Pinel, with the Imperial army, who has much distinguished himself, and earned the first red button. He came to Shensi with Li, one of whose battalions he commanded. I met him at Hwa-chau, on his way back to Tientsin. But Tsau-chu-men brought him the Imperial order to return with him to Kansu, where he will command six battalions. He is now the only foreigner in the army, in these provinces.

Besides these elements of strength, the exuberant harvest which has been obtained this year in Shensi allows the Imperial army to be well provided with food. Money, too, appears to be plentiful. The Mahomedans, on the contrary, can be cut off from their chief sources of supply, and may finally be obliged to surrender to an overwhelming army. Their lot in this case would be, to be killed to the last man.

Since my entry in Shensi, I have been constantly among soldiers and officers. Among the latter there are men of a military turn of mind, who in time of war will do honour to their position. Nor are the soldiers, who are mostly from Honan and Hunan, made of bad stuff. They have mostly a stout frame, and can stand fatigues remarkably well. But they are not animated by either a military or a patriotic spirit, and the only means to keep up a slight discipline among them is, the fearful power of capital punishment which every commander of at least one battalion wields over his own men. It is made use of liberally, and many are the soldiers' heads which are cut off by the executioner. Can there be any more forcible illustration of the complete lack of military spirit than this, that the executioner is one of the comrades of the criminal, and yet receives five hundred *cash* for cutting off his head!

January 14th.

I am about to leave this place, and hasten to finish this letter. To complete my narrative of the operations of the Chinese army, I must add, that Tsau-chu-men is to march with his twenty-two battalions of Li's troops directly through the whole length of Kansu to Su-chau, a distance, from here, of 3,200 *li*, nearly one half of which is through territory occupied by the rebels. Although he is to act independently from Tso-kung-pau, his movements will assist the intended operations of this general. It is confidently expected, that the rebels will not dare to oppose the march of Tsau, and will avoid any collision with his troops. They have no cannon. The chief weapon they use is said to be a sort of gingall fastened on the saddle. They have no infantry, but fight only on horseback, and owe their successes to quick and unexpected attacks. In the level country which predominates on the road from Lan-chau-fu to Suchau, cavalry would be no match to well armed infantry, provided that the military drill is equal on both sides. But it is probable that the Mahomedan horsemen know still less of drill in rank and file than even Chinese infantry.

I do not know for how long time Tsau is to occupy the western end of Kansu; perhaps he will wait there until Ho-chau is taken by Tso-kung-pau, cutting off the Mahomedans from any retreat to the west. But I understand from his own officers, that his real place of destination is Ili, where some of the cities that were formerly under Chinese dominion are now occupied by Russian troops, who prevent in that province any declaration of independence on the part of the Mahomedans. Those same officers say (I give the information for what it may be worth), that the Russian Government has requested the Chinese authorities at Peking to retake possession of those cities, declaring that the Russian troops will withdraw on the arrival of the Chinese. Tsau is waiting for a reinforcement of thirty battalions before undertaking the march beyond the Kia-yu-kwan gate, through the Shamo desert, to Hami and the region beyond.

We may therefore be prepared to hear before long of the restoration of Chinese rule, not only in the province of Kansu, but also in the regions beyond extending to the Russian frontier. If these successes should be achieved, the Chinese owe them to a great extent to foreign arms and, in the West, to Russian assistance. Whether they will attempt after that to re-establish their dominion in the direction of Yarkand and Kashgar, remains to be seen. All these tasks appear, on account of deserts and distances, far greater than they are in reality. An enemy who withdraws immediately on the approach of a few well armed Chinese battalions is certainly a contemptible enemy, even though the Chinese be overawed by his supposed valour and energy. The Chinese have overpowered the nations of Central Asia before they were able to bring into the field foreign arms andcannon, and they should certainly have easier work now, when the mere rumour of their weapons can clear an entire province of rebels.

I have been invited to travel to Kansu with the army of Tsau, whose officers and soldiers have invariably treated me very civilly. This would be a fine chance for an adventurous traveller. But it will probably be a march of several months, and by joining it, I will lose all the good season for Szechuen and Yunnan, where I find just as unexplored a region, and perhaps also just as much, or as little, fighting.

I have collected on my journey much material which, I trust, will be of interest to the Chamber of Commerce. But I shall not be able to work it up before my return to Shanghai. In a few weeks I hope to notify you of my arrival at Ching-tu-fu.

I am, dear Sir,

Yours respectfully,

F. VON RICHTHOFEN.

No. VII.

Amherst College

LETTER

BY

from BARON RICHTHOFEN

ON THE

PROVINCES

OF

CHILI, SHANSI, SHENSI, SZ'-CHWAN,

WITH NOTES ON

MONGOLIA, KANSU, YÜNNAN AND KWEI-CHAU.

SHANGHAI:
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1872.

No. VII.

TO THE COMMITTEE OF THE SHANGHAI GENERAL CHAMBER OF COMMERCE.

SHANGHAI, *May* 1872.

GENTLEMEN,

I have the honour to notify you of my return from a journey through the northern and western provinces of China, and to submit to you those results of it which may be of interest by their more or less direct bearings upon practical questions. As on former occasions of a similar nature, I must ask your indulgence for the fragmentary character of these communications, which were written on the journey itself, and without an opportunity of comparing my observations with those made by others who had travelled previously over portions of the same ground.

I left Shanghai on September 27th 1871, and embarked for Peking. It was a long journey at that time, as the country was inundated, and the current in the Pei-ho run still with great force. Much time was lost at the capital in the attempt to make travelling arrangements for the entire journey as contemplated. I adopted finally the plan of making contracts with muleteers and carters from one great city to the next, and this proved afterwards to be, in many respects, the best method of proceeding, as it tends to procure for every portion of the road such men as are well acquainted with the country. For myself, my interpreter Paul Splingaert, who assisted me with his excellent services also during this last journey, and my Chinese servant, I purchased Mongolian ponies. With these I performed a journey of five months, to Sü-chau-fu on the Yangtse, whence I descended the river by boat.

I started from Peking on October 25th, bound for Tai-yuen-fu, by way of Kalgan. I did not take the usual road to the latter place, which leads through the Nankou-pass, but went to the hills west of the capital, and found an extremely mountainous but highly interesting mule trail, across hills and narrow gorges, to Pau-ngan-chau, whence I took the road to Siuen-hwa-fu and Kalgan. After spending a fortnight on a trip through the southern portion of Mongolia, I reached Ta-tung-fu. Thence I travelled through the whole province of Shansi from north to south, leaving it at the fortress of Tung-kwan, on the great bend of the Yellow River. From that place I followed the high road to Si-ngan-fu.

In Shansi and Shensi I seldom left the high road, because any great deviation from it, to the northernmost portion of Shensi or to Kansu, is at present attended with much delay, on account of dangers which must be avoided; also because the additional results, which I should have been able to get, did not appear to be commensurate with the time and trouble required for arriving at them. I succeeded, however, in gathering some information regarding those countries.

After a sojourn of twelve days at Si-ngan-fu, I made for Sz'-chwan, by the only connecting road in existence. It leaves northern Shensi at Pao-ki-hien on the Wei-river, crosses the range of the Tsing-ling-shan, passes a few miles from Han-chung-fu, and, through the cities of Ning-kiang-chau, Kwang-yuen-hien, Kien-chau, Mien-chau, leads on to Ching-tu-fu.

Although my journey by land, as originally comtemplated, ended at Ching-tu-fu, I could not resist the temptation of trying to add to it a trip through the southwesternmost portions of China, and to explore the mountains of western Sz-'chwan, as well as the provinces of Yünnan and Kwei-chau. Besides hoping to contribute to the general knowledge of the geography, geology and resources of those unknown regions, I wished to examine the metalliferous deposits that are widely spread through them, and to gather some information respecting the many independent tribes inhabiting south-western China, and their languages. My final object, however, was, to explore the road from Ta-li-fu to Burma. I had some difficulty in collecting the necessary information, but finally settled upon the plan, to travel by way of Ning-yuen-fu to Ta-li-fu, a journey of about 45 days, and thence to go to Tang-yuë-chau, the last place reached by Major Sladen on his way from Bamo to Yünnan. From that city I intended to go again eastward, by Yünnan-fu and Kwei-yang-fu, the capitals of the provinces of Yünnan and Kwei-chau, to Chung-king-fu on the Yang-tse. By executing this comprehensive and effective plan, I could hope to realize all I had projected. I have no doubt that I would have succeeded, if I had not met with an accident of a peculiar kind. As it prevented me from executing what might perhaps have been the most interesting portion of my journey, I beg leave to state some particulars.

I started on the proposed journey from Ching-tu-fu on March 11th, and proceeded energetically. Everything went on very satisfactorily till the 19th of March, when, about half way on the road to Ning-yuen-fu, having nearly reached the summit of the high Siang-ling pass, between the cities of Yung-king-hien and Tsing-ki-hien, a completely unprovoked and murderous attack was made upon my interpreter and packtrain, in which the former came near being killed. I had walked slightly ahead, and was an unseen spectator of the scene, from a house situated higher up the hill. The place was at 8,000 feet altitude, on a narrow path leading along a precipitous and snowcovered hill side. The attacking party consisted of 47 men, mostly coolies, who came from the opposite direction, and carried a coffin with the remains of the wife of a general high in command in the department of Ning-yuen-fu, the rest being an escort of soldiers from Hunan, and an officer in command of them, from the same country. The headmen of the coolies, who instigated the attack, did it evidently with the purpose of squeezing money, relying on their superior numbers. But the general excitement which immediately ensued made the attack murderous. My interpreter, after knocking the first men down, had to run for his life from the overwhelming force, closely pursued by them, and narrowly escaped the poles and iron clubs swung upon him. He had the presence of mind to draw his revolver but not to fire it. My sudden appearance, in hurrying down the steep slope, with the same weapon in my hand, put an end to the attack.

We waited now for our men and animals, and, as they did not come, were obliged to walk back to them. We found them turned back by the gang, and possession taken by them of horses, guns and baggage. A ransom, first of ten, and then of four hundred, taels was asked for the restitution of my property, on the invented pretext, that my men had broken off a piece of the coffin, which, by the way, had been quite a distance away from the scene of action. Our attempts to bring the men peaceably to their senses, and to have our property restituted, were in vain, partly because they were a large force (their number having been swelled by passing coolies) and hoped to get their squeeze, but chiefly because they were kept in excitement by the officer, who got them up to such a pitch as to make a repetition of the attack imminent. It would not have been difficult to settle the matter with the actual use of our arms. But the killing of men who were not professional highway robbers would have put an immediate and disastrous stop to my journey. The only alternative by which I could hope to continue it was, to leave the property in the hands of the men, and to deliver them up to the Yamen of Yung-king-hien, two days back on my road. The satisfaction which lay in the fact, that we two isolated foreigners were, although not without danger, escorting a gang of nearly fifty prisoners, who could by no possibility escape in that country, through crowds of their own people, was a poor consolation for the depressive feeling of having to descend the high pass which it had cost so much labour to climb. On the second day we hurried on to Yung-king-hien, feeling sure of our prisoners, who made slow headway with their bulky load, but could not possibly abandon it and had necessarily to go to the same place. On our arrival in the city, the Yamen, which has no soldiers at its command, was much afraid, that, not being able to imprison the whole crowd, the men would create a riot against us, in which it would have no power to protect us, the more so as it was market day and the city crowded with people from the country. Happily we were much ahead in arriving, and succeeded in turning public opinion in our favour. The mandarin of the place, a native of Ningpo, of the rank of a Tautai, did what was in his power. The coolies were left free at my request, but their headmen punished much more severely than I desired. This was for the attack. The insult in having me turned back, the appropriating my property, and the expense and loss of time were to be charged to the Hunan officer. But he escaped free. He could not be punished by the civil mandarin, and the latter was afraid to keep him in custody longer than he could help it, because he would provoke the rage and vengeance of all the Hunan officers in the vicinity.

It was precisely the same consideration which induced me finally to give up the plan of my journey. The road to Ning-yuen-fu had been described to me as very dangerous, since a portion of it leads through the territory of the independent tribe of the Lolo, who attack frequently, in great numbers, small travelling parties going with baggage. That danger had not deterred me, because arms can be freely used against Lolo. But here was a danger of another kind. For at least thirty days more, I was to travel through a region in which a great many soldiers are stationed, not of the regular army, but so called "yung-ping" or hired soldiers, commanded by officers who belong to the regular army and are nearly all from Hunan. These men are strongly animated by a clanish spirit, which is increased by the peculiar circumstances under which they live. The rumour of our affair would, of course, spread along the whole line of the road, and arrive at the various military stations in a distorted and perverted condition. General Li himself, who is stationed on the road, would hear the invented story of the violation of the coffin of his deceased wife. The coolies, of which there are considerable numbers on the road, would hear that some of their fellows had been flogged on my behalf. The Yamen foresaw these dangers immediately, and offered to send an explanatory letter ahead of me. But when I requested to have a copy of it given to me, for using it as a circular letter in my own hand, they gave me, after much hesitation, a completely unsatisfactory piece of writing, declaring openly, that they could not state the truth in it, as that would cost the head of the Hunan officer, and

provoke the vengeance of his numerous comrades. I had therefore before me almost the certainty of a repetition of the first adventure, not one time, but several times, and under circumstances which would make the use of arms unavoidable. It was not the accident itself, but these threatening consequences, and chiefly the prospective necessity of using arms, which turned me back.

I must add, that my proposed road followed for hundreds of miles a narrow strip of land inhabited by Chinese, which is accompanied on either side by high mountain ranges, in which dwell independent tribes. An escape from the road in any other direction is therefore impossible.

It is worthy of notice, that the adventure which turned Mr. T. T. Cooper back, a few years ago, happened at his entrance, farther west, into the region where the military stations commence. As both accidents are of a nature unexampled in other portions of China, and officers of the regular army were concerned both times, it appears that the passages to the west will be shut up to foreigners, unless something be done to check the lawless behaviour of the officers who are stationed there.

In no other portion of China is a plan of travel, once given up, so completely frustrated as in western Sz'-chwan. The country is blocked up, as it were, by a barrier of high mountains inhabited by independent and hostile tribes. I had chosen the northern road across them. Turned back from it, I had the only chance left of crossing the barrier at Hwui-li-chau, four and one half degrees of latitude farther south. No other road leads from east to west for that whole distance. I went accordingly, by way of Ya-chau-fu and Kia-ting-fu, to Sü-chau-fu on the Yangtse, which is properly the key to Yünnan. The journey to this province and Kweichau is perfectly easy and safe. But the season was too much advanced to execute, from Sü-chau-fu, my great original plan; and any other plan, such as a visit to the capitals of both provinces, appeared so paltry and so little promising of important results, as compared with the plan I had given up, that I determined to leave the examination of the whole southwest to some future traveller. Thus it happened, that I executed nothing more than the plan of travel which I had the honor to lay before you, before I left Shanghai. I collected some information in regard to the south-western regions, and then proceeded down the Yangtse, making only occasional excursions off the river. I left Sü-chau-fu on April 10th, arrived at Chung-king-fu on the 16th, at I-chang-fu on May 2nd, at Hankow on May 17th, at Shanghai on May 21st.

With very few exceptions, my experience with the natives was pleasant throughout my journey. And as regards the mandarins, I am bound to speak in the highest terms of their endeavours to assist and protect me whenever it was desired by me.

On account of the diversity in character of the regions traversed, I will again treat on the different regions in the order in which I passed through them, and interrupt my account occasionally by a chapter on such topics as concern larger extents of country.

CHILI, MONGOLIA, AND SHANSI.

1.—*FROM PEKING TO THE COAL-MINES OF CHAI-TANG.*

A few miles west of Peking rises a group of gentle hills. From their outliers, on which Yuen-ming-yuen is situated, they ascend gradually to an altitude of about two thousand feet above the plain. They are well known to every visitor of the capital, on account of the numerous temples built in their recesses, in which the foreign residents of Peking take refuge during the heat of the summer. These hills are joined to the west by high and rugged mountains. South of the river Hun-ho no such intermediate link exists: the steep descents of the high ranges bound there abruptly the wide plain; while north and northeast of the capital, the level country extends into some deep bights between mountainous promontories.

There are few regions in China the detailed exploration of which would so well repay the labours of the geologist as these mountains, the abutments of which afford a grand panorama as seen from the walls of Peking. Deeply evaded rivercourses expose their interior structure with remarkable clearness, and the opportunity is rare in any country of studying cross sections of stratified formations equalling in grandeur those which can be traced here with perfect ease. The interest they afford is increased by the occurrence, under very peculiar circumstances, of numerous coalbeds, which yield several varieties of coal, and, in some localities, may be of prospective value.

I proposed to visit the most known of these localities, namely, the valley of Chai-tang, situated about fifty miles* (by road) west of Peking, amidst rugged mountains. The usual direct

* The "mile" adopted in the following pages is the English statute mile (69.16 to one degree of the equator), unless otherwise stated. Of Chinese *li*, which shall be occasionally made use of as a measure of distances, 200 are equal to one degree; exceptions shall be especially mentioned.

road to it having been examined by Mr. Pumpelly, I attempted to approach the place from the south. Starting from Peking, I crossed the Hun-ho at the celebrated bridge Lu-ko-chiau, and went in the direction of Fang-shan-hien, then made for the hills, where the river Liu-li-ho leaves them in a steep gorge, and was fortunate to find a sort of bridlepath, badly in repair and rather dangerous for pack animals, but ascending rapidly the range which divides the headwaters of the Liu-li-ho from the valley of Chai-tang. The Miau-ngan-ling pass, by which I crossed it, has the altitude of about 4,500 feet.* The descent to Chai-tang is steep. The road leads at nearly right angles across the strike of the strata. After having traversed great thicknesses of underlying formations, a great portion of which consists of limestone, I was surprised to walk over a regular succession of coalbearing strata, the thickness of which, estimating it step by step, as I proceeded gradually from the lowest to the highest strata, exceeds seven thousand feet.

Coal occurs at five distinct levels in this succession of strata. In no part of China did I find the productive portion of the coal formations with a stratigraphical development approximating in thickness this at Chai-tang.

The supply of the capital and of the port of Tientsin with cheap and good fuel from the neighbourhood may at any time become an important question, and is already a subject much speculated upon. I hope therefore to be justified if, without going into details of merely geological interest, I enter into a more accurate description of the main features of the section between the Liu-li-ho and Chai-tang. It is indeed the clue for understanding the coalfields around Peking.

The Liu-li-ho, for a long distance before leaving the hills, is cut in limestone which belongs, probably, to what I called in another letter the Nanking-system.† Just before the river enters the plain, the limestone beds are slightly bent in the shape of a shallow trough and, in this, conformably overlain by sandstone and slate which contain several (at least six) beds of anthracite varying in thickness from two to ten feet. We may call them the *Liuli-beds;* they constitute the *lowest and first series of coal-seams.* Quite a number of mines are worked on both sides of the river. The coal is of tolerably good quality, but lacks solidity. These beds of anthracite, which can be always easily recognized by their immediate superposition on the limestone, are mined in several places west of Peking; for instance, at the Ma-ngan-shan, which faces the plain south of the Hun-ho; and at the Chai-to pass, a few miles west of the well-known He-lung-tan temple, and no more than 25 miles, by level road, from Peking. The mines of Fang-shan-hien, which contribute largely to the supply of Tientsin, are probably worked on the same beds. It can safely be presumed, that the Liu-li coal-beds are of all the most widely spread in the vicinity of Peking, because all the overlying strata were to be removed before they could yield to denudation.

West of the coal-mines, the Liu-li-ho is enclosed between nearly vertical walls of limestone and other rocks of still greater age. At the distance of forty li, the little place Hung-mei-chang (meaning "anthracite-market") is reached. Here, the coal, which is brought down the hills on donkeys, is put on camels, to be carried to Peking. The road follows now for thirty li a narrow crevice in the limestone, through which an affluent of the Liu-li-ho descends. At that distance it arrives at the village of Tai-ngan-shan, known to the coal merchants of Peking as supplying the best kinds of anthracite. First, the anthracite-beds of the Liu-li series reappear, overlying conformably the limestone, and following its dip to the west-north-west. Their position, at this place, is unfavourable. Small portions only of the coal-beds were easy of access, and those are worked out. The thickness of slate and sand-stone in which these seams are imbedded is about 600 feet. They are covered by about 1,500 feet of unproductive strata. Then begins the *second series,* commencing with about 500 feet of black coal-slate. The next 1,400 feet contain thirteen coal-beds, most of them varying in thickness from six to ten feet. We may call them the *Tai-ngan-beds.* The highest coal-seam is capped by a layer, one hundred feet in thickness, of a coarse conglomerate of limestone and quartz, which occurs here for the first time, and reappears frequently in higher levels. This magnificent series of coal-beds has, in my opinion, the highest intrinsic value among all which occur in the vicinity of Peking. I have seen them only in this one locality, which is situated at an altitude of nearly four thousand feet and very difficult of access. The strike of the strata is W.S.W.—E.N.E., the dip from 50 to 65 degrees W.N.W., and sometimes approaching the vertical. They run at right angles across some steep ridges separated by deep gullies, and afford therefore great facility for mining. Some beds, where they had a vertical position, have been quarried out from the top of the ridges downward. The place formerly occupied by a coal-bed is now conspicuous as a narrow and deep cut in the hill. A few mines are being worked now, chiefly on the "hu-tsau" or "thick seam," which averages ten feet in thickness, but is liable to considerable swellings. The coal of all the seams is anthracite; all I have seen is slaty, very lustrous, and unusually solid, has a short conchoidal fracture, and contains very little impurities. It is superior to any other anthracite I know from

* All altitudes mentioned in this letter are approximations, based on preliminary and rude calculation of aneroid measurements, and in the case of those mountains which I did not ascend, mere estimates.

† Letter on Nanking and Ching-kiang, p. 9.

the vicinity of Peking. This opinion is confirmed by the fact that, although the coal must be carried 45 li down hill on a steep trail to Hung-mei-chang, which is still 125 li distant from Peking, it can be sold at the mines at the high price of Tls. 10.50 per 100 piculs, and yet compete with the coal from other places situated much nearer the capital. There is no market on hand for small coal. Fortunately there is but little of it. The anthracite leaves the mines nearly all in solid cubical lumps of from one to two cubic feet each, and many are still larger. I have traced the Tai-ngan beds, by the lines of old mining works, for some distance in a south-westerly direction. They continue also with great regularity in the opposite direction, and are probably worked in the mines of Muntakou, situated near the edge of the plain, but appear to be there nearly worked out, so far as the Chinese are able to mine advantageously.

The *third series*, which crops out near the Miau-ngan pass, may be called the *Miau-ngan-beds*. It is separated from the Tai-ngan beds by about 1,000 feet of sandstone. It contains two beds of anthracite, said to be six or seven feet thick each. Their position is not favorable for mining. I do not know of the existence of these beds in any other locality.

I estimate roughly at, at least, 2,000 feet the thickness of the long series of variegated sandstones, shales, and conglomerates which, on the road from the Miau-ngan-ling down to the valley of Chaitang, separate the third series of coal-beds from the *fourth* or *Ta-tsau series*. This consists of several beds of anthracite, enclosed between strata of yellow and black argillite, calcareous marls and sandstones, all of which contain a large quantity of tolerably good iron ore. These strata are very similar in character to those which enclose the great anthracite seams and beds of iron ore in southern Shansi. Also does the anthracite of the Ta-tsau mines resemble closely that of Ping-ting-chau in Shansi, as regards its aspect and large conchoidal fracture. It contains, however, more impurities (chiefly clayey bands) than the other, and soils the fingers slightly when handled, which is not the case with the Shansi anthracite. Although worked now only at the Ta-tsau mine, fifteen li S.S.W. of Chai-tang, this system can be distinctly traced from there over the "Mei-ling" or "Coal-pass" to the village of Ma-ling, nine li from Chai-tang. All the coal accessible to Chinese mining is worked out for this entire distance. The Ta-tsau mine was described by Mr. Pumpelly. I did not enter it, because I arrived there late in the evening. One of the two coal-beds swells, in places, to 30 feet thickness, and is said to average no less than 12 feet.

This system is 600 feet thick. It is immediately overlain by the *fifth* or *Futau series* which carries bituminous coal. To this belong a few mines situated five li south-southwest of Chai-tang, and known as the Fu-tau mines. There appear to be four coal-seams in that place, imbedded in the highest portion of a series of grey sandstones and argillites. The uppermost seam is thin, and no work is done on it. The next one below is said to be from 5 to 9 feet thick, the third from 1 to 5 feet. Both of them swell up in some places to greater thickness, and in others dwindle down to almost nothing. The existence of the lowest seam is only marked, by old works which are abandoned. The coal extracted from these seams is bituminous coal, and Mr. Pumpelly has shown that it is of very good quality, so far as its chemical composition and heating power are concerned. It appears that, at the time of his visit, work happened to be done in places where the coal-beds were unusually wide and, therefore, the coal solid. When I was at the mine, the proportion of lump coal was small, and this had a flaky structure, such as is often found in the neighbourhood of the outcroppings and in much disturbed coal-beds. The owners of the mines complained of the want of regularity in the thickness of the coal, and the position of the seams. Many small disturbances are indicated at the surface of the ground. The 5 to 9 feet seam dips 40 degrees W. N. W. at the surface, and at little distance underground is vertical; the third disappears in some places entirely, and must be traced at considerable expense. At the time of my visit, work was done at two mines only, by about twenty workmen, who were able to take out about 250 catties a day each. The price of lump coal was Tls. 0.1.5 per mule load of about 200 catties, or about Tls. 1.2.0 per ton. Dust coal is sold for local consumption only, at one-fourth of the price of piece coal; and coke at Tls. 15 for 100 piculs. Both the ancient and the present works extend no more than 1,500 feet in length on the hill side.

It is evident, that the idea (which, as I learn, has been suggested) of constructing a rail-road from Peking to Chai-tang, for the sake of the exploitation of the Futau coal-beds, has no support in the actual state of the mines. What is being extracted at present would barely be sufficient to feed the locomotive; and it would be rash to speculate on any great increase of extraction before the locality is minutely examined, and the existence of the coal-beds over a large area, as well as the improvement of the coal in depth, as regards solidity, are proved. It is not likely that the result of such an examination would be satisfactory. The vicinity of Chai-tang has been the theatre of violent disturbances, caused by the eruption of porphyry during or after the last period of the deposition of the coal formations, and the Futau coal-seams suffered most by them. Coming from the south, the disturbances, as well as the porphyry and its accompanying conglomerates, are first met with at the Futau mines. The small extent of the mining ground is not due to the inexperience of the Chinese in tracing coal-beds, but to the fact, that the strata which contain the coal-beds are cut off in every direction, partly by erosion, and partly by the intrusion of porphyry. They occur still in a few other places within a few

miles north-west of Chai-tang, but in each of them much disturbed and limited in extent. Their mode of occurrence in these places makes it, however, probable that the Futau series contains other coal-beds besides those worked at the Futau mines, and that, if the series could be found anywhere complete and in a less disturbed state, it would be extremely valuable.

A railroad to Chai-tang would be expensive, because it must traverse rugged mountains; its sole object would be the transportation to Peking of the bituminous coal of the Futau beds, and, perhaps, of iron which might be made from the ores contained in the Ta tsau series; it would have its terminus at Chai-tang, as no continuation in any direction is feasible. For the same amount of money which these fifty miles of railroad would cost, another line might be pushed some hundred miles south of Peking, in the direction of the great commercial roads to Shansi, Honan and Shantung, all of which provinces are full of coal-mines and deposits of iron ore, compared with which those of Chai-tang are utterly insignificant. If one ventures at all to frame already definite railroad schemes, those lines should be thought of in the first place, which, while establishing the connection of seaports with great coal-districts, follow at the same time the most important of the actual roads of commerce, and pass the greatest possible number of populous cities. The construction of an almost useless line, to an out-of-the-way place such as Chaitang, would hardly be a prudent commencement.

I regret that I must already break off the meager information which my last journey has enabled me to contribute in regard to the coal-fields in the vicinity of Peking. The establishment of the existence of productive coal formations in an almost unparalleled stratigraphical development, and with an aggregate minimum of one hundred and forty feet of coal (taking 30 feet for the coal-beds of the first series, 65 for the second, 15 for the third, 18 for the fourth, and 12 for the fifth), although an interesting result, is of importance only in so far as it suggests, how desirable it is, and how important for the Chinese Government, to make a minute survey of the vicinity of Peking. I did not describe here the lithological character of the various strata. But it is so characteristic at the different levels, that it will afford a most valuable guide for tracing the existence of coal-beds in places where only the enclosing strata are exposed to view.

No sanguine expectations should, however, be formed on the strength of the great development of the coal formation. It is an unfortunate circumstance that, in the mountains near Peking, the disturbances of stratification have been very great. While their effect has been, on the one hand, to expose to view the various portions of the coal-bearing system, and to make valuable coal-beds (such as those above Tai-ngan-shan) easily accessible to the miner from gorges and hill sides, enormous portions of the same strata were, on the other hand, brought by the same causes into exposed positions, from which they were swept away by the gradual action of water. A few remnants of them is, in fact, all that is left; they are chiefly in those places where enclosing ranges, made up of more ancient formations, afforded protection, or where porphyry and its hard conglomerates have capped the soft strata which constitute the highest portion of the coal formation. To this circumstance alone do the coal-seams of the Futau and Ta-tsau series owe their preservation in the vicinity of Chai-tang, and it is safe to predict that they will be met with in very few other places near Peking. Probabilities are more in favor as regards the Tai-ngan series, and they are greatest in respect to the less valuable anthracite of the Liuli beds. If the Tai-ngan beds should indeed extend from the place where I have described them as far as Muntakou, then they may still form the subject of mining on a large scale and in a conveniently situated place.

2.—*REGION OF SIUEN-HWA-FU.*

Going north from the basin of Chai-tang, we leave the coal region of Peking. Both are bounded in that direction by a rugged range, which trends from south-west to north-east, and attains in its summits an elevation of from 5,000 to (probably) 8,000 feet above the level of the sea. It may be called the *Nankou range*, because the Nankou pass leads through it. Farther west, the Hun-ho intersects it in a rocky gorge. I went straight across it, about twelve miles west of the river, on a bridle-path which connects Chai-tang with the city of Pau-ngan, a distance of fifty miles.

The Nankou range is an important feature in the configuration of these northern regions. From the Miau-ngan-ling (south of Chai-tang), its southern descent presents itself as an almost straight and apparently vertical wall, rising on the other side of the basin of Chai-tang, and separated from its gentler slopes by a belt of rugged hills. These are made up of porphyry, which overlies and cuts off the coal measures. The range itself consists chiefly of Sinian limestone,* the strata of which rise first at an angle of 45 degrees from underneath the coal-basin. At the altitude of 3,000 feet the trail reaches the foot of the wall, and at about 6,000 feet its top. It is built up of nearly horizontal strata of Sinian limestone. A fine view presents itself here of the region to the south. The rugged sea of limestone hills in the background, wild like the

* Letter on Nanking and Chingkiang, p. 7.

petrified billows of a sea beaten up by a typhoon, and the deeply eroded gorges in the foreground, around Chai-tang, are an image of the convulsions and disturbances to which this portion of the coal region of Peking has been subjected. Leaving the broad Nankou range on its northern side, we look down into wide valleys separated by ridges which are enveloped in loess nearly to their top. All these ridges are chiefly made up of Sinian limestone, which has undergone only slight disturbances of stratification. Its total thickness, including several intercalated beds of argillite, exceeds 8,000 feet. The dip is slightly south, and therefore, as we proceed north, lower and lower strata enter into the composition of the ridges.

Already, at the time of the deposition of the first coal measures, the Nankou range formed the shore of the coal basin of Peking. But those of later age were deposited on both sides of it, and several fragments of them are scattered north of the range.

The region between the Nankou range and the Great Wall, so far as it belongs to the province of Chili, form the department of Siuen-hwa-fu. Its area is about 6,600 statute square miles. It is highly interesting, on account of its isolation and peculiar character. In more than one respect it forms the intermediate link between the plain of Peking and the Mongolian plateau. It collects the waters descending from the borders of the latter, in the *Yangho*, and receives those of the *San-kang-ho*, which flows through regions of northern Shansi having much in common with that of Siuen-hwa-fu. These rivers unite, near Pau-ngan-chau, into one single channel, the *Hun-ho*, which, in descending to the plain of Peking, breaks through the Nankou range in a narrow and tortuous gorge. The numerous wagonroads which connect the cities in that region among each other converge in a similar way towards the Nankou pass, which is the only outlet for traffic in a south-easterly direction. Betwoen this and the next western highroad to the south, which connects Ta-tung-fu and Tai-yuen-fu, high ranges of mountains, and the wild country beyond them, restrict all intercourse with the south to a few bridlepaths. The two highroads even can scarcely be called wagonroads, as only empty carts can, with considerable difficulty, be carried over the passes. To the north, on the contrary, there are numerous and easy connections with Mongolia.

Siuen-hwa is eminently a loess region. Wide valleys prevail. They have little bottomland. But smoothly, and at a very low angle, the loess rises on either side, frequently to 1,500, and even 2,500, feet above the rivers, and nothing but black pyramidal summits, which overtop the yellow slopes, mark the situation of the enveloped limestone ridges. In exceptional instances only, the limestone rises precipitously from the bottom of the valleys. The rivers, unless temporarily swelled by rains, are shallow, and run swiftly in their wide and sandy beds. They are not navigable.

The climate of Siuen-hwa is very cold in winter, and very hot in summer. The amount of rain appears to be less than it is in the rest of Chili. The soil is fertile, as Loess always is. The products are agricultural, and contribute largely to the supply of Peking with wheat, vegetables and fruit. Next to wheat, the staples of the produce are: Kaoliang, oats, millet, maize, pulse, potatoes. The last are largely raised in this region, as well as beyond the Great Wall, and in the northern half of Shansi. In the valleys they are, like Indian corn, only eaten by the poor; but in the mountains, potatoes have become an indispensable article of food. They are scarcely excelled in quality by any raised in Europe. Yet, their price is generally as low as 400 cash, or 33 cents, per picul. Fruit thrives remarkably well. Chief among them is the grape. Pears, apples, plums, apricots, peaches, persimmon, melons, water-melons are raised in large quantity. They are inferior in flavour to those raised in Europe, with the exception of the apricot. Vegetables are largely cultivated, and are of good quality.

Peking is probably the largest customer for this produce. A considerable amount is also exported to Mongolia, in exchange for mutton, beef, horses, skins, and furs. The only other source of revenue is, the large traffic through the country, on the roads from Peking and Shansi to Kalgan. It employs many hands, and allows the people to dispose of some produce for feeding a large number of travellers and of animals of burden. The population appears to be able to supply with ease their little wants. Probably one-half of the inhabitants live in caves dug out in the loess. The cities have broad streets, but present otherwise an uncomfortable appearance; chiefly Siuen-hwa-fu, the pretentious walls of which enclose a large space not half occupied by dwelling-houses. The only place of importance is Kalgan or Chang-kia-kou, which I will mention again in connection with Mongolia.

The mineral produce of Siuen-hwa is only *coal*. It occurs in the following places:

1st. *Yü-chau*. A fine kind of bituminous coal, sold in solid tabular pieces; burns with little flame and little smoke, does neither cake nor coke, and leaves a very small amount of fine white ash. It has a large conchoidal fracture, is of perfectly black colour and dull lustre. It is said to be mined on one seam only, north of Yü-chau, which lies horizontally and is from 4 to 6 feet thick. At the mines it costs one cash per cattie, at Kalgan, where it is much used, six cash.

2nd. *Si-ning-hien.* A peculiar kind of coal, which must be called anthracite, because it emits neither smoke nor flame, nor any bituminous odour. It is of brownish black colour, has a waxy lustre, small conchoidal fracture, and contains numerous small globules. When lighted, it will slowly glow away, for hours or days, according to the size of the piece, until consumed; no draft of air need be applied. The residue is a white, exceedingly light and flaky ash. The mines are said to be south of Si-ning-hien, on the same range of mountains with those of Yü-chau. At this place, too, one seem only, having a horizontal position and from four to six feet thickness, is said to be mined. The coal is brought to Kalgan in fine solid pieces of a slaty texture. The cleavage planes are often covered with a fine fibrous film which has the appearance of charcoal. This coal is much valued by the Chinese, and said to be used, in open basins, in the Imperial rooms at Peking, to the exclusion of any other kind. With the exception of an occurrence of inferior importance mentioned by Mr. Pumpelly, and a doubtful one mentioned under 6, this is probably the only anthracite-like coal mined north of the Nankou range. The best proof is this, that Chaitang supplies a portion of the department of Siuenhwa, including Pau-ngan-chau, with anthracite. The Sining coal is sold at Kalgan at nine cash a catty.

3rd. *Kiu-Pau-ngan* or *Pau-ngan-chau.* A locality twenty miles west of that city was mentioned to me as yielding bituminous coal. But this statement is doubtful. I visited a place situated sixteen *li* north of Pau-ngan, on the right bank of the Yang-ho. A well developed coal-formation overlies there unconformably the Sinian limestone, and is itself unconformably overlain by porphyry-conglomerate. It contains a considerable number of coalseams. But what was within reach of Chinese mining is worked out, and the mines are abandoned. The mines can easily be re-opened and worked on a larger scale; but I failed to get any reliable information regarding the quality of the coal and the thickness of the seams.

4th. *Sin-Pau-ngan.* This locality, together with the adjoining one at the Ki-mi-i-shan, is mentioned by Pumpelly. It is situated on the left bank of the Yang-ho, and the coal-beds appear to be the continuation of those mentioned under 3. Mining is still done in a place at some distance east of the river, between the hills. The coal brought from there is strongly bituminous, but apparently of no good quality for ordinary use. The range of its consumption ceases with Siuen-hwa-fu, which is situated no more than one hundred *li* from the mines. At Kalgan, the bituminous coal from Yüchau (240 *li* distance) and even of Tatungfu (380 *li*) drive it out of the market. It must therefore be presumed that it is much inferior in quality to both.

5th. The same way of reasoning must create a still greater prejudice against some coal which is said to be mined a short distance northeast of *Siuen-hwa-fu,*

6th. *Tumulu* and *Siau-tung-ko.* I add to the list these two places, because they belong to the jurisdiction of a district (Wan-tsiuen) of Siuen-hwa-fu, although they are situated beyond the Great Wall. Tumulu is a small market-town about fifty miles west of Kalgan. Siau-tung-ko lies six miles farther west. From this place the coal-formation extends twelve miles more in a westerly direction, past the missionary station Si-yin-tse, to San-pau-ko. At Tumulu, anthracite is said to occur, but I do not consider the statement reliable. With that exception, the coal from all localities within the long range is bituminous, and varies little in quality. It has a slaty texture, very lustrous layers changing with others of a dull appearance. All what is extracted is from near the surface. This fact may explain the considerable admixture of pyrites and the softness of the coal. It is a caking and coking coal, gives much flame and smoke, but leaves little ash. This coal is of very recent origin, as is indicated by dicotyledonous leaves occurring with it. It verifies probably Mr. Pumpelly's supposition regarding the Tertiary age of some coal which occurs in two places in the neighbourhood of Kalgan. These are the only instances known in China of the occurrence of coal so recent in origin.

This list comprises probably all, or nearly all, coal-mining localities in the department of Siuen-hwa-fu. Although that region is of little commercial importance, it will always attract some attention, as being the thoroughfare for the few existing natural approaches to a large portion of Mongolia. This situation makes it admirably adapted to become hereafter, together with Ta-tung-fu, a manufacturing country. Mongolia is capable of supplying a great quantity of raw material, such as wool, camels hair, and hides, while Siuen-hwa-fu and Ta-tung-fu possess a large amount of fuel.

3.—*BEYOND THE GREAT WALL.*

The Great Wall constituted in ancient times the boundary between China proper and the territories inhabited by the Mongols. It does no longer occupy this position The Chinese element has spread beyond it, taking possession of some centres of commerce and of some tracts of arable land. The political boundaries, too, of the provinces of Chili and Shansi have been pushed far into Mongol territory. But these arbitrary lines exist only for the convenience of the present Chinese government, and have nothing whatever in common with the natural boundaries that actually exist between China and Mongolia and are marked in some places, approximately, by the Great Wall. They are, however, not a well defined line, but a belt of territory of varying width, in which the three elements of division, the geological, the geographical and the ethnographical, are singularly intertwined.

A short geological sketch will explain the nature of that belt. I have stated, that, in the region of Siuen-hwa-fu, the rocks of the Peking system, and in particular the Sinian lime-stone, predominate over all else in the structure of the mountainranges which protrude above the loess. Just as, in the Nan-kou range, these rocks rise out of the coal-basin of Peking, they yield, farther north, their place to gneiss and granite, which, being anterior to them in age, rise abruptly from underneath them. They form at once wild and bold mountains, the frontrange of a portion of which was called by Pumpelly the *Barrier-range*. Together with gneiss, volcanic rocks make their appearance. They are spread out over the uneven surface of the gneiss, fill out its depressions, and form a continuous sheet of lava with a gently undulating surface. A few islands of gneiss protrude still above the lava. Now, in quite a general way, the volcanic rocks in this region are the plateau of Mongolia proper, while the gneiss constitutes the descent to China, and makes up the dividing belt. The undulating edge of the volcanic sheet is elevated from 5,400 to 7,000 feet above the level of the sea, while some of the islands of gneiss attain even a greater altitude.

On the volcanic plateau, the water collects, in general, in shallow basins, from which it evaporates. All products of decomposition are therefore deposited in valleys and basins within the area of the plateau, and, notwithstanding a cold and dry climate, give origin to that rich growth of herbal vegetation which is the essence for the existence and occupation of the Mongol. From the belt of gneiss, on the contrary, all the water descends towards the large valleys of Siuen-hwa, and through their rivers to the sea. The volcanic sheet, where it borders the gneiss, is broken off abruptly, its steep walls exposing the vertical structure of the lava. Formerly, it covered the gneiss more extensively, but it has given way to decay, and is still receding very slowly along its edge, chiefly in those few places where a small portion of the plateau is drained towards the gneiss.

The geological boundary is there where the gneiss first rises from underneath the lime-stone rocks, or, at least, from the broad valleys immersed between them. Both the Great Wall and the ancient ethnographical boundary coincide approximately with it. The geographical boundary is, where, together with the volcanic rocks, commences the country without outward drainage. This line is, at the same time, the present ethnographical boundary. The undrained region, which is exclusively inhabited by the Mongol is called by the Chinese "*Tsau-ti*" or "grass land" while the belt of Chinese colonies between it and the Great Wall is the "*Kou-wei*" or the "region outside the gates."

At Kalgan, this belt is very narrow: a short ascent leads from the Chang-kia-kou gate of the Great Wall to the volcanic rocks of the plateau. East of that place, the gneiss-belt attains a considerable width. It constitutes sharp crests, separated by deep and narrow ravines, in which a Chinese population thrives in cultivating patches of loess which, the last remnants of a more universal cover, are scattered from the bottom of the ravines to the top of the ridges. It is surprising, after having crossed over several of them, to see, on arriving on the summit of the last, suddenly a vast grassy plain with undulating surface spread out at a level with it. On the boundary stands the last Chinese village; then follows the Tsau-ti with Mongol tents. West of Kalgan, the belt of gneiss attains even a greater width. It rises precipitously from the loess-valleys of Siuen-hwa and Ta-tung. But, farther off, extends a broad land of gneiss, with wide valleys of from 4,000 to 5,000 feet elevation. The Chinese colonies extend up as far as the drainage is southward. The gneiss, the colonies, and the outward drainage are bounded together by the abrupt edge of the volcanic sheet.

The contrast is very marked, if one descends westward from the Mongolian camp Hanurtai, towards the missionary station Si-yin-tse. After having seen, for days, nothing but grass-land, with here and there an isolated Mongol camp, and with numberless heards of cattle, sheep, camels, horses, and goats, grazing around shallow basins with an undrained pool in the centre, or in valleys descending towards larger lake-basins, and all these depressions separated from each other by long and gently sloping ridges made up of sheets of black lava—one arrives quite unexpectedly, at an altitude of about 6,000 feet, at the edge of the plateau, and overlooks the large flat basin of Tung-niu-kwan. It teems with scattered villages, the houses of which, roughly constructed of loam, could, in November, be scarcely discerned between the high grain-stacks which surrounded them. Although situated only 250 feet lower than the edge of the plateau, it is drained to the sea, and its bottom is granite. The Chinese settlers, all of them men from Shansi, have since a few years advanced to this valley from below, bringing with them their domestic habits, their industry, their implements of agriculture, and their commercial spirit. And on the same extent of ground where, a short time ago, a few Mongols earned a scanty subsistence by letting their heards feed on spontaneous vegetation, a Chinese population, probably amounting to thousands, by substituting systematically planned for spontaneous vegetation, finds not only the means of collecting wealth, but exports the produce of the fields to the neighbouring districts of Shansi, and to the Mongols themselves. The contrast between nomadic and agricultural life is seldom so strikingly exhibited, and however strongly a hasty visit to the "Tsau-ti" may predispose the mind in favour of the frank and hospitable Mongol, that single sight is sufficient to illustrate vividly the superiority of the hardworking Chinese, though the level be low at which the race has stopped on its former road to progress.

The Chinese immigration into Mongol territory has commenced centuries ago. It was, at first, a purely political measure. The Emperor Kang-hi, especially, fostered it, by deporting criminals and building fortified cities. But the most rapid progress in the way of spontaneous colonization appears to have been made in the last decade. From the scanty information I gathered in regard to the subject, the boundary line between Chinese and Mongolians, west of Kalgan and east of the great south-bend of the Yellow River, would coincide very exactly with the divide of the affluents of the Hun-ho and Hwang-ho towards the country without outward drainage. If this is correct, the territory converted there from Mongolian into Chinese would comprise about 6,500 (geogr.) square miles. The country beyond, the "Tsau-ti," is (for the present) reserved for the Mongols by law, and Chinese are forbidden to settle upon it. It is a noteworthy fact that both nations are so strongly separated. While the Chinese have nearly succeeded, in Manchuria, to assimilate with themselves, by intermarriage, and, as it were, to conquer, that race which now rules them, they can gain upon the Mongols only by pushing them back. No intermarriage takes place, and the Mongols do not assume, as the Manchu do, Chinese language and literature. This circumstance renders the Mongols dangerous neighbours, and they may become terrible if their dormant force be wielded by some strong controlling power, whether it be exerted by individuals of their own race, or by a nation superior to them.

The Chinese have built in the Kou-wei several cities, which do the trade of the surrounding districts. The chief produce of the fields, in the highest regions, between about 4,500 and 7,000 feet above the sea, consists in oats, flax, and mustard. The last two are threshed together, and oil is made from the mixed seeds. The fibre of the flax is of inferior quality, and no use made of it. Besides these staples, which are largely exported, buck-wheat and potatoes are raised for home consumption. Below that is another region, where wheat, beans, millet, hemp, and kaoliang are added to the first. The valleys around Kwei-hwa-ching, which are reputed as highly productive, belong to this region. An important branch of business is, the breeding of mules. The immense stock of them employed in China is recruited chiefly from those annexed territories beyond the Great Wall.—The climate of Kou-wei west of Kalgan is dry and cold. The winters are long, and the cróps frequently a failure. Yet, good profits are secured by cultivating a great extent of ground. The title to unoccupied land which an individual selects is given by the Yamen. Fifty Taels for 500 mow is a frequently occurring price, but not the rule. Manuring is not required during the first years. As much as possible of the virgin soil is ploughed, with the aid of Mongolian ponies, which are hired at a nominal price. In later years, manure is procured from the Mongolian pastures for a trifling expense. The labour on the field is done by Shansi labourers, who visit the Kou-wei yearly in great numbers and work for low wages.

The mineral produce of the Kou-wei west of Kalgan appears to be small. Besides the coal field of Tumulu, noticed in the last chapter, Mons. Armand David mentions coal-mines near a place "Sartchy," north-west of the south bend of the Yellow River. They supply a large region with bituminous coal and coke, but the city of Kwei-hwa-ching is said to be supplied from the mines of Ta-tung-fu. Salt is made near Fung-ching and Kwei-hwa-ching. Some mineral veins, finally, with copper ore and argentiferous galena, occur in the gneiss east of Kalgan.

Beyond the Great Wall, east of Kalgan, the aggression of the Chinese upon Mongol territory is apparently greater than west of that place, but extends probably not throughout the whole region which is drained towards the sea.

4.—*MONGOLIAN COMMERCE AND PRODUCTS.*

The Mongol is not endowed with any commercial spirit. He loves money, and likes, too, to spend it liberally. In purchasing, he is not so much directed by the value of a thing as by the fancy he has for it. Such people are, of course, easily duped by their shrewd neighbours, to whom commerce is the essence of life; and the Shansi-merchants who have monopolized the Mongolian trade are enriching themselves fast with its spoils. The products of Mongolia are few. Horses, cattle, sheep and camels occupy the first place. Valuable furs range next. Of raw produce, the country furnishes: hides, wool, and camels hair; of manufactured goods: the prepared skins of sheep and goat, a sort of felt, and so-called Mongolian cheese and butter. Vague rumours of the occurrence of coal in Mongolia are current among foreigners; but I failed to find them authenticated.

The Mongols purchase from the Chinese: cotton-cloth, chiefly from Hupè, tea, and tobacco. They are fond of small ornaments, arms, knives, all sorts of coloured cloth, fine blankets, and many little articles of luxury, and have a taste for what is good and solid. Chinese industry, chiefly that of the north, is little adapted to supply these fancies, and there is room for a small but remunerative trade with European goods, of which the Mongols are exceedingly fond. They are now provided only with inferior ware. The wealth of the Mongols is by no means inconsiderable. The money they earn for live stock reared almost without expense and brought to market on its own legs amounts to very large figures. Although considerable sums go to temples and lamaseries, it is difficult to see what becomes ultimately of these profits.

The centres of commerce, in the south, are Kalgan, Kwei-hwa-ching and Lama-miao. Of these, Kalgan appears to be the most important for transit and entrepôt, but to be much surpassed by the others as regards real trade.

There are two directions taken by the commerce bound for Mongolia from the south. One is by sea, and the other by land. Those goods which come by sea are transhipped at Tientsin, and enter Mongolia, almost without exception, by way of Kalgan. The land-commerce converges from various directions in northern Shansi, and then branches off on two roads, one of which passes through Kalgan, while the other goes directly to Kwei-hwa-ching. From Kalgan, the commerce spreads in three lines, namely to Kwei-hwa-ching, Urga with Kiachta, and Lama-miao.

Kwei-hwa-ching, the ancient *Kukukhoto*, is now an entirely Chinese city, said to be very large, and the seat of an extremely lively commerce. The Chinese merchants themselves have in their hands the great traderoads from there to Uliassutai and Kobdo, to Hami and Ili, and to Ning-hia-fu, all of which places are other centres of Chinese trade, while the Mongols repair to Kwei-hwa-ching by many other routes of minor importance. Of late years, the trade on those great roads has diminished, on account of troubles connected with the Mahomedan rebellion of the northwest. Yet, the commerce of Kwei-hwa-ching is large, because it commands a very extensive portion of Mongolia.

Lama-miao, which is still often designated by its Mongol name *Dolonór*, is said to be of less importance, and supplies a smaller extent of country, than its western rival.

Kalgan, or *Chang-kia-kou*, has little trade of its own, and is chiefly known as the key for a good portion of the Siberian and Russian commerce. This transit-trade is, however, surpassed in importance by that to Mongolia. To it is owing the conflux of people in Kalgan. Reports on this place have been made from so competent sides, that I cannot aspire to add to them any information of value. It is rare, even in China, to witness, in the same degree as here, an extremely lively commercial intercourse. The streets are thronged with people, carts, camels, horses and mules. An incredible amount of small bartering, exchanging, equipping, approvisioning is constantly going on, owing to the existence of a fluctuating population said to amount to tens of thousans. Also of the resident population the greater part consider themselves as visitors on a long term, and have their families in some other place or province. Kalgan is the terminus of transportation from the north as well as from the south. Animals of burden and other means of conveyance are changed, and a considerable commission business is made by the attending change of contracts.

Among the trade-roads starting north from Kalgan, that to Kiachta is chiefly conspicuous, on account of the transports of tea which go over it. Besides the shipments made by Russian merchants, large quantities of tea go through Kalgan on native account. On the highroad through northern Shansi, I was almost daily addressed in Russian, by Chinese merchants accompanying long caravans of camels loaded with brick-tea, and destined for Kiachta via Chang-kia-kou. This tea is from Hupè and Hunan, and goes from Hankau, by way of Fan-ching and Shi-ki-chin, to Shansi, where it passes through Lu-ngan-fu, Tsin-chau and Tai-yuen-fu. Thirty-four miles southwest of Ta-tung-fu, the road forks. One portion of the tea goes directly to Kwei-hwa-ching, and the other to Kalgan.* It is known that the teas for Russia passed formerly through Shansi. Undoubtly they took the road here indicated. Of late years, before the opening of the Suez-canal caused the Russian teas to take quite a different direction from Hankau, it was contemplated, to re-open the old road through Shansi, and to transport the tea via Kwei-hwa-ching, Uliassutai, and Kobdo to Russia. It is evident that on this road a great saving in distance would be effected, as compared with that by Kiachta.

5.—*THE LOESS.*

The daily renewal of my experience with regard to the loess-formation during the first half of my last journey, and its paramount importance in the economy of the northern provinces, may excuse it if I venture to return once more to this subject which I have already treated in one of my previous letters.† I am able to speak now more positively about it in many respects, and hope to present it under some new points of view which may be of interest in an economical respect.

I will repeat from my first description, that the loess is a solid but friable earth of brownish-yellow colour, and, when triturated with water, not unlike loam, but differing from it by its highly porous and tubular structure;—that these tubes are often lined with a film of lime, and ramify like the roots of plants;—that among the constituents, very fine sand and carbonate of lime predominate next to the argillaceous basis;—that the loess spreads alike both over high and low ground, smoothing off the irregularities of the surface, and that its thickness exceeds often considerably one thousand feet;—that it is not stratified, and has a tendency to vertical cleavage;—

* The amount of tea shipped on Russian account via Kalgan is well known from the Customs reports of Hankau and Tientsin. The quantity of both brick and leaf tea shipped from Hankau, in 1871, on native account, through Shansi to Kalgan and Kwei-hwa-ching was given to me, at Hankau, as 280,000 piculs.

† Letter on Honan and Shansi, p. 9

also, that the loess is full of fossil land-shells and contains bones of land-quadrupeds, but no remains either of marine or of fresh-water shells.

The loess is peculiar to northern China, and does not spread over the southern provinces. Chili (with the exception of the alluvial plain), Shansi, northern Shensi, Kansu, and northern Honan are covered with it. In southern Honan and in Shantung it is spread over large areas; but the mountains in these two regions are free from it, and it is extensively overlain with the alluvial soil of the plains. It disappears gradually towards the lower Yang-tse and the lower Han-river, the last insignificant remnants appearing on Tung-ting-lake, Poyang-lake, and near Nanking. Farther west, the limit is very sharp. The Tsing-ling-shan, which divides northern and southern Shensi, is covered with loess on its northern slope. But that formation disappears completely on its southern side. Not a trace of it does exist in Sz'-chwan. I do not positively know, how far it extends in the direction of Central Asia. It appears to continue to near Liang-chau-fu in western Kansu, that is, to the confines of the basin of the Yellow River. Beyond it commence those regions where the waters collect in inland basins. In these, the loess appears not to be conspicuous. Towards the east I know it to the vicinity of Mukden.

It is owing, in a great measure, to the existence of the loess, that northern China differs much from southern China, as regards scenery and products, the mode of agriculture and the means of transportation. In the loess regions, the mountainranges are usually buried in loess with their lower portions, and the space between two ranges is occupied by a broad trough of loess, sloping very gently down from either side. There are instances when the trough closes on all sides, so as to form a basin filled with stratified soil in the bottom, which bears witness to the former existence of a lake in its place. I shall have to mention several basins of this kind in the province of Shansi. In most instances, however, the slopes of the loess extend down to the river that drains the trough. Then the alluvial bottomland is, at the best, very narrow, while the beds of the rivers are in general wide and sandy, the streams themselves shallow, and, with some exceptions hardly worth noticing, unfit for navigation. In some cases, as on the Wei-river in Shensi, there is a gradual slope on one side of the river, and a steep mountain-wall on the other. Besides occupying the intermediate spaces, the loess spreads over the mountains themselves. Where they form tablelands, loess constitutes their flat summits, and the rocks are exposed underneath it, in the eroded watercourses. Where mountainranges are narrow and precipitous, loess still spreads over the passes; it opertops the rocky precipices, and creates isolated patches of soft soil with gentle outlines, in places at great altitudes and difficult of access.

The difference of level of the places where the loess occurs is truly remarkable. Where its hills fringe the plain of the lower Yellow River, they rise only a few hundred feet above the level of the sea. But in climbing up to higher regions, one never loses sight of the yellow soil. In Shansi, I found it largely predominating over everything else, at all altitudes up to 6,000 feet, and met it in many places of greater elevation, on the Wu-tai-shan at 8,000 feet. Yet its character is always the same, the only differences being these, that, where it lies in great thickness, its lowest portions are of a reddish colour, and where it adjoins a mountainrange, deep cuts will expose layers of rocky débris intercalated more or less frequently between those of loess. They continue for some distance from the hills which furnished their material, until they wedge out between unstratified loess; they designate therefore no planes of stratification. The loess is always completely unstratified.

It must, however, be remarked, that in many places occurs what may be called *regenerated loess*, that is, loess carried away by water and redeposited in basins. All alluvial plains in the loess regions are underlain by it, and where rivers are cut through the alluvial soil, they expose it to view. This formation *is* stratified. To a superficial observer it will appear like true loess, but it differs from it in many essential respects. I will only mention these, that it is impregnated with saline matter which effloresces from the exposed surface, and that water will stand in pools and ponds on its surface, while the loess, on account of its porosity, sucks it up like a sponge.

Agriculture and human habitations are confined, in the north of China, to the alluvial soil and loess. After leaving the Great Plain, the first is very scarce, and the loess almost monopolizes the agriculture. If it did not exist, northern China would probably be a barren country. Where it is absent, the mountains of the northern provinces present, without exception, that arid aspect which is known of the Shantung promotory and the hills near Chifu. They bear almost no trees, and few shrubs, and the low herbaceous vegetation is prevented from being luxurious, by the custom of the inhabitants to tear it out with the roots, in winter, and use it as fuel. This is almost the only use to which the hills not covered with loess are put. Agriculture commences immediately with the appearance of the loess, and is coextensive with this formation, following it into every nook and corner, and to every altitude. This circumstance gives rise to one of the most distinct points of difference between the north and south of China. If we except Sz'chwan and (probably) Yunnan, the southern provinces present the remarkable spectacle, that the hills, although inviting cultivation by the most luxurious growth of spontaneous vegetation which clothes them, are, as a rule, excluded from it, with the exception of those limited portions of their slopes which allow of terracing and artificial irrigation. Notwithstanding a warm and fertile,

which allows two and, often, three crops a year, we see agriculture rarely extending to more than a few hundred feet above the plains and valleys, and far inland it attains seldom the altitude of 2,000 feet above the level of the sea. In the north, on the contrary, no altitude to which loess rises is too great for agriculture to follow it. In the Kou-wei, I found the loess extensively spread at 7,000 feet altitude. It was covered with fields, and many villages stood between them. But the most striking instance I have seen is on the Wu-tai-shan, in northern Shansi, where the loess-ground is cultivated at an altitude which is probably no less than 8,000 feet.

These facts will suffice to show the vast importance of the existence of the loess, for agriculture. But there is another point of view which puts it into a more prominent light. I have pointed out on another occasion,* that it appears that the Chinese are able to cultivate only a certain portion of the soil, which bears a direct ratio to the quantity of manure they are able to supply and, in second order, to the density of population. I illustrated this statement by the slow rate at which the grounds left uncultivated in Kiang-nan and Che-kiang, in consequence of the depopulation by the Taiping rebels, are regained to agriculture.

This remark is not correct as regards loess-regions. Shensi was depopulated by the Mahomedan rebels during the last decade, at least as much as Nganhwei by the Taiping's. Among the ruins of villages which counted their houses by hundreds, there are frequently no more than half a dozen inhabited at present. And yet, it appears that, within the short space of two years, since the withdrawal of the rebels from Shensi, the whole ground has been regained to cultivation. I travelled in the valley of the Wei-river a distance of 250 miles, and seldom saw an acre of loessfield that was not cultivated. The disproportion of the number of the population and the extent of ploughed ground was perfectly amazing. And yet, there is no cattle kept for manuring purposes. There are two reasons that may explain this extraordinary difference in the rates at which the ground is recultivated in Shensi and in Nganhwei. Firstly, no kind of ground is easier ploughed than loess. A little loosening of the surface is perfectly sufficient for most purposes, as the ground is light enough for water to penetrate. Secondly, loess yields crops without manuring. The farmers on the Wei-river stated, that not half the ground is manured; that manuring increases the yield in grain, but a satisfactory crop can be obtained without its application, provided the ground receives a sufficient quantity of rain. This is a startling fact, if it is considered that the valley of the Wei-river has probably been under cultivation since several thousand years. I must, however, modify the generality of my statement. A certain kind of manure is indeed generally applied. It is loess itself. The fields are encased, on two or three sides, between vertical walls of loess. Every year, some inches of the earth are cut off from them, and the field covered with it.

There are two causes which render it probable, that loess, where it is normally and largely developed, cannot be exhausted. The first relates to the organic substances required by the vegetation. They are, chiefly, carbonic acid and ammoniac. It is probable, that the great porosity of the loess, shared by no other kind of soil in an equal degree, renders it capable to absorb these gases from the air in an extraordinarily large proportion. The second refers to the anorganic substances. They are likely to be supplied by a process due to the same property of the loess. In the absence of any planes of stratification, the rain-water descends far into the porous loess, and meets the humidity retained in its lower portions; and, in obedience to the well-known laws of the diffusion of liquids, the substances which are kept in solution below will be communicated to those portions of the water next to the surface, and be taken up by the vegetation, so far as required. The process is the same as the familiar one by which certain substances which are constituents of the soil far below the surface are caused, by rain-water, to appear as efflorescences on the surface.

The want of a sufficient quantity of rain will, therefore, be doubly injurious for the loess-regions, and, as a rule, very good crops change with very bad ones, years of plenty with such of famine, whish is indeed the case throughout the north.

As regards the kinds of agricultural products raised on the loess, I shall have occasion to mention them in connection with the different regions which I traversed.

Next to its mode of distribution and its porosity, the most important feature of the loess is, its tendency to vertical cleavage, which gives rise to extraordinary peculiarities in the configuration of its surface. No scenery presents smoother and gentler, and more monotonous outlines than a loess-basin, if overlooked from a high point of view. The general inclination, in very large basins, exceeds seldom two feet upon one hundred. The country would appear to be most perfectly adapted for cavalry. And yet, loess-basins are impassable, even on foot, if the very carefully traced roads are not kept. Who leaves these, is perfectly lost, and will have more difficulty in getting a-head, than he would among rocks and cliffs. For, in every direction, he will find himself suddenly before a crevice with vertical walls, perhaps no more than a few yards wide, yet from 40 to 200 feet deep. Following it in an up-hill direction, he will find it to have

* Letter on Chekiang and Nganhwei, p. 14.

miles in length, and to ramify into several crevices, and each of these to branch out again, until, by constant multiplication, they become innumerable. Following the first chasm down the hill, he will soon find himself on a narrow spit caused by the joining of a second chasm with the first; and if he could follow it farther down, he would see more and more branches coming in, each of them enclosed between high vertical walls, and increasing in width and depth. The even ground above slopes down to them in a number of terraces with vertical faces, and ends frequently in a last vertical wall five hundred feet high, which descends to a rivulet below. If a birdseye view could be taken, it would show the river, which flows in the axial bottom of the trough, fed by a great number of gullies descending from its sides, every one of them resembling a trunk growing out of an infite ramification of roots and rootlets. Where the main river winds its course through alluvial soil in the shallow bottom of a trough, intercommunication is easy on this low land, and from it, every one of the ribs forming the divide between two systems of gullies can be ascended without difficulty. Frequently, however, the loess extends across the valley at a much higher level than that of the river. Then the continuity of the trough is interrupted by a deep chasm, narrow in the bottom and lined by vertical walls, but widening higher up by a series of irregular terraces. Such chasms are often over a thousand feet deep. The road most then leave the river, and go across gullies and dividing ribs. With extreme difficulty, very circuitous lines are found that afford a grading which renders intercommunication not quite impossible.

Such is, more or less, the nature of all loess-basins. Nothing is more deceiving than their apparently gentle outlines. The manner in which the gullies are formed and widened can still be distinctly seen. Water undermines a loess wall, and large vertical slabs tumble down, widening the gully. The manner in which it grows in length illustrates curiously the tendency to vertical cleavage. Following one of its last branchelets up to its place of origin, we find its width in the last portion generally no more than 3 or 4 feet, and its depth from 30 to 50 feet. It terminates obtusely, with a vertical and concave face. But the tendency to cleavage in the direction of the chasm continues beyond that place. Water, penetrating from the top through invisible fissures, oozes out at the bottom of the terminal edge, causing there a retrograde erosion of the soil. After some time, a round and perfectly vertical pit is formed, a few feet back of that edge, by the tumbling down of a portion of the earth which had lost its support below. This pit is now the real end of the gully, although still separated from its visible portion by a solid bridge, which yields gradually to decay. In a similar way to this, a pit is occasionally formed near the side of the chasm, in a place where the water happened to find some fissure. In this case, too, it commenced carrying away the earth next to the bottom of the chasm and, by undermining, cause the ground above to cave in the shape of a pit. This cylindrical hole is the beginning of the formation of a secondary gully, which, in the course of time, proceeds backwards in the same manner as the first, and will itself give origin to other branches of the third order.

Imagination, following up these simple processes of erosion, can easily conceive how, in their endless combination, they must result in the creation of the most curious and fantastic configuration of the surface. Wide chasms are surrounded by castles, towers, peaks, needles, all made up of solid yellow earth, between which small and large gullies radiate labyrinthically upwards, into the walls of solid ground around. High up on a rock of earth, steeper than any rock of stone, stands the temple of the village, or a small fortress, which affords the villagers a safe retreat in times of danger. The only access to such a place is by a spiral stairway dug out within the mass of the bluff itself. In this yellow defile, there are innumerable nooks and recesses, often enlivened by thousands of people who dwell in caves dug out in the loess. Through every gully they climb up to their fields, each of which is a small terrace for itself, encased by vertical walls on two or three sides, and descending in another wall to the next field below. The natural tendency of the loess to form terraces assists here the Chinese in their endeavour to convert sloping ground into level fields ascending by steps—if it did not, perhaps, give the first origin to that habit. There are indeed few other lines in loess-scenery but horizontal and vertical ones. Looking down a slope of loess, nothing is visible but fine green fields; looking up, all is yellow and cliffy, because only the naked vertical walls of the terraces can be seen.

The majority of the people inhabiting loess-regions live in caves. They select, with great skill, those places where the ground is firm, and many a cave has been inherited down through several generations. The loess contains always solid nodules of a calcareous or, rather, marly substance.* An excellent cement is made of them, and the walls of the caves are lined with it.

* It is the fact of the occurrence of these calcareous nodules which has induced Mr. Kingsmill, in a paper recently published, which I received after the closing of this letter through the kindness of the author ("The probable origin of deposits of 'loess' in northern China and eastern Asia" by Thomas W. Kingsmill; Quart. Journ. of the Geological Society, for Nov. 1871), to assume that the loess is stratified. And indeed, such an opinion may be easily formed, if the opportunity for observing the nature of the loess is limited to a few places. Those elongated and rather phantastically shaped nodules, the well-known "Loess-Maennchen" (loess-men) of the German peasant, are very frequent wherever loess occurs. Generally, they are distributed through it without regularity or order; but frequently they are particularly crowded along certain planes, which are slightly inclined, or approach the horizontal. These planes interrupt the continuity of unstratified loess at intervals of from ten to five hundred and more feet, and assist considerably in the natural formation of terraces. But they lack the requirements of planes of stratification, such as the horizontal position of the flakes of mica, and appear rather to indicate the record of periodical events that happened during the time of the formation of the loess and were attended with a slight

Many of these dwellings are comfortable, and well lighted; they are warm in winter, and cool in summer. In a place that is considered favourable, thousands of caves are frequently crowded together in a small space. The presence of drinkwater has much to do with the selection of these places. It is usually got in wells, at the depths of from sixty to eighty feet, but has always an alcaline taste, and contains much lime. I have never seen a spring issuing from loess, and, not improbably, that never occurs. But copious springs issue at the bottom, where the loess rests on other rocks. The gullies carry water when it rains; otherwise they are dry, excepting those which penetrate through the loess to the underlying rock. A brook forms in them, fed by springs, and continues to flow in the gullies below, even if encased in loess only, because an impervious layer of loam has formed in their bottom.

The construction of roads on loess is, in view of its peculiar features, a hard problem, in many instances; and the engineer who shall have to build the first railroad across it will find himself in the face of difficulties unknown in other regions. The tracing of a line on the divide between two systems of gullies is comparatively easy; but that is not so often required as to cross gullies and divides. Besides, the slow changes which work their way irresistibly must be provided for. In the history of the loess-regions, the difficulties of intercommunication have certainly contributed much to determine the success of wars. Scarcely anywhere is there so much opportunity given for entrenchments, and armed resistance in naturally fortified places. The Tung-kwan gate, of which I shall speak in another page, is only one among the numerous instances that are constantly met, illustrating the effect which the defence of a single place of access in loess-narrows must have against an aggressive force.

With regard to the mode of origin of the loess, I will not detail, at this occasion, the many additional proofs which I collected, against the assumption of its aqueous origin, and in favour of the theory proposed in my "letter on Honan and Shansi" of its subaërial formation in a region without outward drainage, as the collective residue of uncountable generations of herbaceous plants, assisted by the large amount of material which was spread over the prairy by wind and water, and kept there by the vegetation. We are not accustomed to ascribe to currents of air that influence upon the deposition of solid matter which we see daily illustrated in the work done by currents of water; simply because, under ordinary circumstances, those aërial deposits play a too insignificant part to attract our attention, and are soon swept away by water. Things are quite different in an extensive steppe without outward drainage, such as the whole north of China must have been formerly, and central Asia with Mongolia are to this day. Rains are scarce in such regions, and the decomposition of the rocks proceeds slowly. Yet it does proceed. The winds, on the contrary, are strong. They will carry off those products of decomposition from the rocks, and distribute them as dust among the herbaceous vegetation. There the dust materials rest, for there is no means for them to be carried farther away. And if rain falls, the water will flow down from the rocks, and spread out upon the gentle slopes, taking with it the products of decomposition, to feed the vegetation with those that are in solution, and to heighten the ground with those mechanically distributed. No stratification can take place, and any approach to it will be completely effaced by the roots, which descend vertically, and are probably the chief agents to produce the lasting tendency to vertical cleavage. What is forming now on the hill-sides, in the valleys and basins, of Mongolia, is probably loess, though perhaps of a peculiar kind near the edge of the plateau, because the material is taken from volcanic rocks of a certain composition. Loess cannot be recognized on the surface, where it is covered by vegetation and a dark colour imparted to it by organic matter; its character becomes only conspicuous in vertical sections. When the edge of the volcanic sheet of southern Mongolia shall have receded so far that some inland basin, such as that of the Anguli-noor, shall be drained to the Yang-ho, then the water will cut deep furrows into the soft soil of the basin, and expose its structure, which will be stratified in the central portion and show the peculiarities of redeposited loess, while the sides will show no stratification and shall have probably the structure of true loess.

Exactly the same configuration that would result from this imaginary deep drainage of the Anguli-noor, is presented by every loess-basin. The general surface, with gentle outlines, which is seen in overlooking the whole basin, is still, more or less, an approach to the form of the ancient surface, dating from that time when the water collected in the bottom of the basin and evaporated there. Later, an outward drainage was effected, and then only commenced the erosion of the deep gullies, and the gradual creation of all those peculiarities in the formation of the surface, which we behold to-day.

change in the nature of this earth next to the surface as it existed in those various epochs. Later, when the growth of the formation had effaced these ancient surfaces, it could easily happen, that the percolating water would deposit the carbonate of lime it carried in solution in greater quantity along some of those planes than through the body of the rest of the loess.

I anticipate the last paragraphs of this chapter, by adding, in connection with this subject, that some other of Mr. Kingsmill's objections against the theory of the subaërial formation of the loess, as advanced by me, are already provided against, by the additional description of the formation, contained in this letter, while this is not the place to discuss his arguments in favour of a marine origin of the loess, for the sake of which Mr. Kingsmill is obliged to assume, that eastern Asia was submerged at least 6,000 feet below the level of the sea at a very recent epoch. That dust-storms should be considered "a means utterly inadequate to the end" is not surprising, as we have so little evidence of their possible effects presented to our observation. But it must be borne in mind, that the mountains of the northern provinces were chiefly made up of the sandy and clayey postcarboniferous strata, which yielded rapidly to decay.

I have devoted to the subject of the Loess more space than may appear campatible with the scope and object of this letter. But I hope you will grant indulgence for this length, in view of the fact, that the loess determines the physical features of regions at least 250,000 square miles in extent, and that to describe the loess is, to describe that which distinguishes northern China from the rest of the Empire, and what influences, and has influenced, more than almost any thing else, its productivity, its adaptedness for mankind, its means of intercommunication, and its history.

6.—*TA-TUNG-FU, AND THE VALLEY OF THE SAN-KANG-HO.*

I returned from the Kou-wei to China proper through the *Ching-chwan-kou* gate of the Great Wall, 20 miles north of Ta-tung-fu. The gate is ten feet high, and constructed of three crooked pieces of wood. The wall was once built in large proportions and provided with numerous towers, but the material applied being sundried bricks of loess, it is decayed. Yet even these ruins, running straight across hills and valleys, do not fail to convey a grand impression.

Ta-tung-fu is a well-built city, situated about 4,000 feet above the level of the sea, in a valley eighty miles long from southwest to northeast and twenty miles wide. The bottom of the valley is level, with the exception of a few low and loess-covered volcanic hills in the centre. Around these, the ground is full of alkaline salts, which give rise to the manufacture of soda. The fertile ground is very limited in extent, sand and alkaline clay prevailing over it. The crops are, kaoliang, oats, millet, buckweat, peas, black-beans. The population is thin; the villages along the road are almost made up of inns.

Two mountainranges parallel to each other and trending from SW. to NE. enclose the valley. That on the northwestern side is visible from it as a straight wall, at least seventy miles long, and rising from 2,000 to 3,000 feet above its base. With it commences the *Coalbasin of Ta-tung-fu*, which is one of the prettiest coalbasins of China. The precipitous wall —in some portions only its foot, in others the entire wall—consists of the rim of the basin, made up of gneiss and Sinian limestone, and the same rocks constitute the floor of the coalformation, so far as it can be seen. The coalbearing strata are horizontal within the basin, and covered by great thicknesses of sandstone, but rise slightly towards the outer wall, and the coalseams crop out extensively on it, above the limestone. The mines extend about thirty miles aleng the line of outcroppings. In one place only the coalbeds are opened a little way off from these. It is in the deep gully of *He-ku-tse*, twenty miles southwest of Ta-tung-fu. The coal is mined there under waterlevel, and shows a great improvement upon that which is taken, at less expense, from near the outcroppings. I visited only one of the numerous mines of He-ku-tse. It may be worth a brief description. The mine is 250 feet deep, and worked by two shafts. One is vertical and very well constructed. Through it the water is raised in large buckets of rawhide, by means of a windlass worked by six men. The other is excavated in the curious shape of a spiral, and provided with stairs. It is used for the extraction of coal, and large enough that one line of men coming up with loads of coal can conveniently pass the line of others who go down with empty baskets. The thickness of the coal-bed varies from twenty to thirty feet. It is a fine black coal of laminated structure and moderate lustre, perfectly clean, and very solid. It burns with a bright flame, giving little smoke. The bitumen is soon burnt out, and then the coal keeps glowing for a long time, leaving finally a little loose white ash. It does not cake, and cokes little. Its only impurities consist in a few clayey bands which contain sulphuret of iron. The coal leaves the mine in fine solid lumps. It is sold at 160 to 200 Ta-tung-cash for a mule-load of about 200 catties, which is equal to Tls. 0.5.0 to 0.6.2 per ton. For taking it to the mouth of the mine, 120 men are empl yed, who go in and out twenty times a day each, and bring up 25 catties each trip. The amount of daily extraction can therefore be safely put down at 500 piculs; the yearly extraction at about 14,000 tons.—Above the big seam which I have described there are a number of others which are too small to be remunerative at the side of it, but are worked in other places nearer to Ta-tung-fu. The strata below the big seam have not yet been examined.

So far as I am enabled to judge, this is an exceedingly fine coalfield. The strata appear to be quite undisturbed, and I know of no other seam of bituminous coal of equal thickness, in China, of which the contrary is not true in a fatal degree. As to quality, the coal ranges high. Its worst feature is its situation so far out of the range of supply for the purposes of foreigners. It will probably be never of any avail for these. But if ever the difficulties which the Nankou pass presents for building a railroad through it should be surmounted, the coalfield of Ta-tung may come to be of importance for a much more extensive region than it is now able to supply. Steamcommunication with Kwei-hwa-ching would find here a reliable basis. That place imports at present its coal from Ta-tung-fu.

7.—*THE PASS AT THE YÈ-MEN-KWAN.*

Five roads leading out of the basin of Ta-tung-fu are worth noticing. The first is a cartroad to Siuen-hwa-fu (360 li), Kalgan (380 li) and Peking (720 li). The second is a cartroad to Tai-yuen-fu (720 li); the third, a cartroad from Ta-tung-fu, through the Ching-chwan-kou gate of

the Great Wall, to Kwei-hwa-ching, and Mongolia in general; the fourth, a bridlepath from the upper end of the Sankang-valley (above Tso-chau), to Pau-te-chau on the Yellow River. It is reported to be very mountainous. At Pau-te there is a passage across the Yellow River, which was much in use before the rebellion for traffic to Yu-lin-fu and the Ordos-Mongols. The fifth road starts 35 miles southwest of Ta-tung-fu into the coal-basin, passes the coalmines of Wu-kia-kou, and goes, by way of Tso-yuen-hien and the Sha-hu-kou gate of the Great Wall, to Kwei-hwa-ching. I do not know whether it is passable for carts. Near the gate it is joined by a mule-trail from Ta-tung-fu. All goods going to Kwei-hwa-ching from Shansi, or passing through the province with the same destination, and coming either from Hwo-lu-hien,* or from Honan and Hupè, take the Sha-hu-kou-road.

I followed the highroad to Tai-yuen-fu. It goes 77 miles up the valley of the San-kang-ho, and then crosses the *Man-tou-shan* range, which borders it to the south, by the Yè-men-kwan pass. One of the branches of the Great Wall runs along the northern foot of the range, and the pass itself is fortified. The highest point is situated about 2,000 feet above the valley of the San-kang-ho, and 2,500 feet above that of the Pu-to-ho, which follows to the south. The last portion of the ascent from either side is very steep, and carts must be unloaded to go across. It is an important passage, strategically and commercially. In the whole of China proper there are only three roads leading to the far north. One is through the Nan-kou pass, the second is over the Yè-men-kwan, the third is in Kansu; it goes from Lan-chau-fu to Ning-hia-fu.

The lively traffic on the road conveys an idea of its importance. I calculated, that at least 2,000 pack-animals, going from south to north, passed the gate on the top of the pass, on the day when I went through it. Among others, there was a train of 300 camels loaden with (900 piculs of) Chinese cotton-cloth, going from Hwo-lu-hien to Kwei-hwa-ching; caravans of from 60 to 100 camels each, carrying tea from Hupè to Kalgan; others with tobacco from Kiu-wu-hien in southern Shansi; wagonwheels, axletrees, and other articles of wood, from Hin-chau, a little distance south; iron, from Lu-ngan-fu; sugar from Hwo-lu-hien, &c. Long trains of donkeys carried fruit from Tai-yuen-fu to Ta-tung-fu and Kwei-hwa-ching. I looked in vain for foreign goods. From south to north were going: mustard; oil of linseed and mustard; soda in bricks, from the mart Kin-Tai-yo in the valley of Ta-tung-fu (sold there at 18 cash a cattie); some salt from Tung-ching and Kwei-hwa-ching in the Kou-wei; then, a large drove of oxen, from Lama-miao; a great number of mules; heards of sheep and pigs. Nearly all the traffic which goes north is bound for Kwei-hwa-ching and Chang-kia-kou, while the southward bound goods go chiefly to Hwo-lu-hien and various plaoes in the plain of Tai-yuen-fu, whence they are further disposed of.

8.—*BASIN OF TAI-CHAU AND HIN-CHAU.*

South of the Man-tou-shan range, we arrive at another large basin. It has a cemicircular shape, and stretches around the western foot of the great Wu-tai-shan mountains. The river *Pu-to-ho* flows through its whole length. It enters the basin at, or above, Fan-chi-hien, passes by Tai-chau and Kwo-hien, and leaves the basin below the market-town Tung-yang-chin. Here it enters a rocky defile, and descends through steep gorges to the Great Plain, where it passes near Ching-ting-fu. The basin consists, chiefly, of loess, but contains, besides, extensive bottomland along the course of the river. The greatest expanse of level ground is in the region of Ting-siang-hien, Hin-chau and Tung-yang-chin. Much of it is sandy, or impregnated with salts, but other portions are very fertile. So remunerative is agriculture in these, that the ground which can be irrigated, and on which two certain crops can be raised, is sold at Tls. 70 a *mou*, while the "dry" loessfields, where the success of the farmers labour depends upon the quantity of rain they receive, and no more than one crop can be raised, are worth Tls. 10 for the same unit. The irrigated ground is planted with vegetables and poppy. The opium is sold at 540 cash per tael; it is not exported, since the quantity produced is barely sufficient for local consumption. On the southern slope of the Wu-tai-shan, the poppy is planted, in protected places, at an altitude of about 6,000 feet.

The southern portion of the basin is inhabited by a numerous and wealthy population, living in well built cities and villages. As the produce of the country is not sufficient for their subsistence, and they must depend, to a great extent, on imports, in return for which they do not furnish any exports, either of raw produce or manufactures, it is evident that the wealth must have its origin in a source of a peculiar kind. It is derived from the commerce beyond the Great Wall, of which the people of Hinchau have appropriated a considerable share. They had formerly their houses established along the whole road through Kansu to Ili, and continue even now the commerce in those distant regions, as well as they are able to do under the difficulties created by the Mahomedan rebellion.

I devoted several days to a very interesting trip across the Wu-tai-shan range, the summits of which rise to about 10,000 feet above the level of the sea. It is the most sacred among the five

* This important place of commerce, which I shall have to mention frequently in the following pages, is noticed in my "letter on Honan and Shansi," p. 20. It is situated in the department of Ching-ting-fu in Chili, and on the western edge of the Great Plain.

sacred mountains of China, and 360 temples are said to be built in its recesses. Most of them are decayed, but some of them are magnificent structures, chiefly the lama-temples. I refrain on this present occasion from any particulars regarding the many points of interest which that mountain-range presents, and the undiscribably arduous pilgrimage made every year by the Mongols to these most sacred temples during the coldest season. From an economical point of view, the fact is noteworthy, that, owing to the presence of the loess, the wild range of the Wu-tai-shan is inhabited to its remotest recesses, and that several villages are built in about 7,500 feet altitude, while the agriculture, as I mentioned in another page, extends to about 8,000 feet. On the southern slope, there are a series of small, but very beautiful and fertile ancient lake-basins, surrounded by loess, bordering on one side on the Wu-tai-shan, and on the other, on rugged hills in which a fair kind of bituminous coal is largely mined. It supplies the southern portion of the basin; while the western and northern districts in it are provided with coal from mines situated near Kwo-hien. The mining-ground of that locality extends towards Ning-wu-fu.

9.—*BASIN OF TAI-YUEN-FU.*

A range of hills, nearly concealed under a thick and broad cover of loess, separates the basin of Hin-chau from that of Tai-yuen-fu. The road which connects them goes over the "Shi-ling" or "Stone-pass," elevated about one thousand feet above the bottom of either. In entering the plain of Tai-yuen-fu, I approached the line of my previous travels in Shansi (1870). I visited on the present occasion the northwestern portion of that plain, which I had not seen then, and will therefore make some additions to my first brief description.

Tai-yuen-fu is a small city, considering that it is the provincial capital. The walls enclose a square of eight by five li, which is not quite occupied by houses, and there are no suburbs. The people are so well behaved, that the foreigner may walk in the streets more freely and unmolested than at Peking. The city is of no commercial importance. It is not very populous, and does not convey the impression of a wealthy place. In ancient times it had a reputation for the manufactury of swords, knives, and various arms. This business has decreased, but gives still occupation to many families, and I was told that even now the government looks upon Tai-yuen-fu as a sort of arsenal. There are also Imperial powder-mills within the city. They exploded recently, but are rebuilt.

The commerce centres in other places in the plain of Tai-yuen-fu. Foremost among them is *Ping-yau-hien,* which is situated on the road from Peking to Shensi, and commands, besides, the road via Tai-yuen-fu to Ta-tung-fu and Mongolia, while the important bridle-path which goes by Tsin-chau and Lu-ngan-fu to Hwai-king-fu in Honan starts from the same place. Some other district-cities, such as *Ki-hien, Yü-tsz'-hien,* and the rich town of *Chang-lan-chin,* have appropriated, too, a good portion of the commerce. *Tai-ku-hien* enjoys the reputation of being the seat of the greatest wealth, some of the richest banker families which have their large houses spread through the chief cities in the Empire having here their homes and families. The same city, together with Kiai-hiu-hien and Chang-lan-chin, are to be recommended to the attention of the antiquarian, as in them are said to be the principal magazines of ancient bronzes and other relics of ancient history for which Shansi is famous. Nearly every city, indeed, has its particular branches of business. A great deal of the wealth of the plain of Tai-yuen-fu must be put to the account of the enterprising spirit of the population; for the plain itself, though fertile in many places, and providing with its produce the adjoining hilly districts, contributes nothing to the exports from the province, and must, on the contrary, import wheat and cotton. The best places, as regards agriculture, are situated on the western side of the valley. Near Tai-yuen-hien are some remarkable springs, which issue forth from the hillside as small rivers, and immediately drive a great number of water-mills. They give also rise to the manufacture of paper, which furnishes occupation to many thousands of people. Then the water is used for overflowing a few acres of ricefields, and finally for general irrigation. The most blessed region of all is, the surroundings of Ching-yuen in Yü-kau-hien. Owing to the fact, that a range of hills keeps off the cold northerly winds which sweep over the rest of the plain, it is a garden of many square miles in extent. Besides other kinds of delicious fruit, the best grapes of China are raised there, noteworthy as the only ones of which good wine is successfully made. The discovery is due to the early missionaries, and their successors continue to make the best use of it, employing chiefly the excellent product of their own vineyards. It is said that the Chinese used to make wine in former time—and the statement is corroborated by Marco Polo—but were forbidden further to do so by Imperial decree, because they partook too freely of it. The price of the best grapes in the season of vintage is about one tael for 240 catties.

The basin of Tai-yuen-fu is immersed into the coalbearing strata. Their position is nearly undisturbed. But in consequence of their gentle and broad undulations, the coalseries itself appears only in some places at a level with the plain, and rises in others some hundred feet above it, or disappears below it, leaving its place in one case to the underlying limestone, and in the other to the overlying sandstones. These constitute the hilly region around. Viewed from a distance, the toplines of all the hills unite to a uniform level, so as to indicate the existence of a

plateau, which is the direct continuation of that of southeastern Shansi. It is covered with loess, and cut through by steep gorges, in which the rivers descend. Many of the gorges are cut through the coalformation, and give rise to considerable mining, which is only limited in extent by the demand of the population for coal. Iron ores occur with the coal, and are said to have formerly given origin to an iron industry at Wang-fung-shan, 70 li west of Tai-yuen-fu; but it was not able to compete with other places in Shansi, and the provincial capital is now supplied with iron from Lu-ngan-fu and Ping-ting-chau. Coal is abundant everywhere, and worth, in most places, little more than the cost of transportation. To Tai-yuen-fu, for instance, it is brought a distance of 30 to 40 li. At the mines, 100 cash is paid for loading a two mule cart, which takes about 1,500 catties. The transportation to the city costs one cash a catty. These prices are equal to eight cents a ton at the mine, and one tael a ton at Tai-yuen-fu, the distance of both places from each other being twelve miles. All the coal occurring in the vicinity is bituminous coal, of good quality, and, most of it, of a fair degree of solidity. The coalbeds are numerous. Those which are worked are generally from three to five feet thick, but attain in some instances eight, and even ten feet. Their horizontal position, and the fact that their outcroppings are exposed to view on hillsides, render mining extraordinarily easy. Besides, most of the coalseams are overlain by hard sandstone, which forms a solid roof in the mines. It needs to be supported only by coalpillars, and reduces the expense for timbering to a mininum.

It is needless to enter into any more detail where both abundance of material and ease of extraction are so clearly demonstrated by the price at which coal is sold.

10.—*FROM THE BASIN OF TAI-YUEN-FU TO THAT OF PING-YANG-FU.*

I left the plain of Tai-yuen-fu at Ling-shi-hien. There I came into the great highroad which leads from Peking to Si-ngan-fu. I went then, for a short distance, from Ling-shi-hien to Ho-chau, over a portion of the road which I had seen on my journey in 1870. From Ho-chau to Ping-yang-fu I followed, on the present occasion, the highroad, while I had formerly visit d, on byways, some coalregions lying west of it. I have therefore to make some additions to my former description. The formations which take part in the composition of the surface are, as I then remarked, very few. West of the Ho-shan range, loess spreads over everything, and underneath it, every ravine discloses either the coalmeasures, or the strata which enclose it below or above. Mining is done in numerous nooks and hollows. The loess gives origin to some of the most difficult passages of the great western road. Among them, the Han-sin-ling pass is reputed throughout China, partly on account of the inconveniences remembered by the travellers who went over it, and partly on account of the important part it has played in Chinese history.

On the Han-sin-ling pass commences a warmer climate. Wheatfields cover the loess up to great altitude above the valleys; the season is earlier than near Tai-yuen-fu, and allows more generally the raising of a second crop; the poppy is no longer restricted to the most favoured localities. The best evidence of the change of climate is given by the large traffic going from south to north, and in particular, from the valley of Ping-yang-fu to that of Tai-yuen-fu. Wheat was most conspicuous among the articles making up that traffic. I met in the space of an hour and a half 520 donkeys loaden with wheat and wheatflower, and I passed their file at the same rate during the whole day of fifteen working hours. According to these figures, 200 tons of wheat and flour would cross the Han-sin-ling pass in one day, in that season (end of December). It came from southern Shansi and went to Ping-yau-hien. Tobacco accupies nearly as conspicuous a place. I met a train of 95 camels, which carried about 300 piculs of it, and estimated this at about one-fifth of all the tobacco which passed me on the same day, on carts, donkeys, and camels. It came from Kiu-wu-hien, 30 miles south of Ping-yang-fu. Most of it was destined for Ping-yau-hien, but some was to go directly through to Kwei-hwa-ching. The rest of the great traffic is made up by cotton, from Ping-yang-fu, Shensi, and Honan; salt from Kiai-chau; tea from Han-kau; paper from Ping-yang-fu; potass from Wan-hi-hien (Kiang-chau), Chilipepper, and an astonishing quantity of glue from Han-chung-fu in Shensi. I note these particulars, because the Han-sin-ling is one of those places where the entire traffic between two large regions is narrowed down to one single channel. But while the goods going from south to north in one day are sufficient to occupy a large railroad train, the animals return empty in going south. Carts only are loaded. They carry, however, no northern goods, but foreign imports and southern produce which came via Tientsin and Hwo-lu-hien. Foreign piecegoods occupy here a conspicuous place.

Hung-tung-hien, which is situated at the head of the valley of Ping-yang-fu, is a small but lively place, owing to the fact, that most of the goods are there transhipped. It is the northern terminus of convenient cartroads. Thousands of donkeys are ready every day to transport the goods over the difficult loess-passes between Hung-tung and the plain of Tai-yuen-fu. The country is very fertile. Irrigable ground is sold at Tls. 45 per mow, the dryest loess-ground at Tls. 3. A small area is planted with rice. Wheat, kaoliang, two kinds of millet, cotton, beans, peas, tobacco, poppy, hemp, are the bulk of the produce. Native cotton was worth, at the time

of my visit, 360 cash a catty (one tael was 1,950 cash), that from Honan 320 cash, the latter being considered inferior to that of Shensi. Native tobacco was 5,000 cash per picul, wheat about Tl. 1 per picul.

Ping-yang-fu, which I had not entered at the time of my last visit, is completely destroyed. The story is told that, several years ago, a band of rebels, coming from Honan, entered the city quite unexpectedly, but left again after a slight pillage. When they were at some distance, the mandarins, in order to give some substance to their projected report to the Emperor of having saved the city by martial defence, ordered some shots to be fired after them from the walls. The rebels, considering this an ungrateful treatment, turned back, and destroyed the whole city, killing a great many people. Since that time, soldiers are stationed among the ruins.

11.—*BASIN OF KIAI-CHAU.*

A ridge of loess, similar in character to that of the Han-sin-ling, but not so high, shuts up the basin of Ping-yang-fu to the south, and separates it from the *valley of Kiang-chau*, in which much tobacco is raised. Its surroundings, to the east, north, and west are as full of coal as those of the other valleys to the north. Anthracite is mined to the east, and bituminous coal to the west. The Fuen-ho takes here a sudden turn to the west. Near the place where it empties into the Hwangho lies the district city of Ho-tsin-hien. The rich coalmines near it provide the southernmost regions of Shansi and a considerable portion of Shensi.

Together with the valley of Kiang-chau and the basin of the Fuen-river, we leave the coalregions of Shansi. The most conspicuous feature of the remaining southwestern portion of the province is the granite range of the *Fung-tiao-shan*. It commences abruptly between Pu-chau-fu and Tung-kwan, and has an eastnortheasterly direction, rising rapidly to 3,000 and, farther on, to about 5,000 feet above the Yellow River. Its northern slope is a straight wall, which rises immediately to the highest summits, while on the south it is covered with loess, which extends in a continuous sheet across the Yellow River. The Fung-tiao-shan is joined on its northern foot by a long depression, which is situated probably more than 120 feet below the level of the Yellow River, although separated from it by no more than forty miles of level ground. It contains the saltmarsh of Kiai-chau. The vicinity is a highly interesting region, and affords one of the nicest subjects for the minute study of those lake-deposits which took place in basins of loess, and simultaneously with its formation.

12.—*SALTMARSH OF LU-TSWUN IN KIAI-CHAU.*

The saltworks of southern Shansi deserve attention, not only because they are the greatest in China, but also because they supply, probably, in a normal state of affairs, a greater number of individuals than any other existing saltworks. Besides, it is safe to assume, that their supply has been continuous, at least since the first commencement of Chinese history, and it is not a daring supposition, that their exploitation antidates considerably the time of Yau, who is supposed to have reigned 5,000 years ago. If any distinct locality, in China, recommends itself for researches on pre-historic man, it is the basin of Kiai-chau.

The region from which the salt comes into commerce is popularly known by the name of "*Lu-tswun.*" This is properly the name of the northern suburb of a large walled town *Yuen-ching*, which, notwithstanding its fine walls and rich appearance, is neither a *fu*, nor a *hien*, nor even a *chin*. It is the residence of a Tautai, who manages the salt monopoly. The sales of salt are made at Ngan-i-hien, Yuen-ching, and Kiai-chau, all of which are very lively, populous and wealthy places, but the name of Lu-tswun has attained a much more widespread popularity than any of the others.

Yuen-ching is situated on nearly level ground made up of regenerated loess, and so full of alkaline salts which effloresce on the surface, that drink-water must be carried to the place from a great distance. Going one mile south, a curious spectacle presents itself. In a long and straight line, stretching away as far as the eye can reach, the level ground is broken off, and slopes down, in terraces, to a basin 300 feet below, and beyond this rises the majestic wall of the rugged Fung-tiao-shan. The basin, known by the name of "Yen-tsz'" or "Salt-marsh," is sixty *li* long, and ten *li* wide. The ground slopes slightly down to the foot of the mountains, and along this extends a narrow sheet of water through the whole length of the basin. This lake has no affluents, the natural drainage beyond the northern rim of the basin being directed away from it, while the summit-range of the Fung-tiao-shan is unbroken by any watercourse. Only the rain which falls on the area of the basin collects in the lake, and the level of this is subjected to little change. No use is made of the lake-water, which is but slightly saline. The marsh, which bounds its northern shore and occupies at least two-thirds of the basin, yields all the salt made in the place. It is said to resemble a beehive, from spring to autumn. When I visited the place, at the end of December, the workmen were busy with preparatory labours.

The ground is divided between 150 corporations, each of which owns a strip of land which extends square across the marsh and lake, and is about 600 feet wide. At the upper end of each strip, on the terraced slope, stand the substantial dwelling houses of the proprietors. The labour is simple. In winter, a funnelshaped hole is dug in the ground, 20 feet deep, and from 50 to 60 feet wide on the top. The ground is a stiff blue clay, full of small crystals of gypsum. The consistency is favourable for terracing the sides of the hole and giving it some solidity. A concentrated brine collects in the bottom. By the same primitive means of swinging buckets, which are often seen applied in Chinese ricefields, the brine is lifted from step to step, to the top, and then led, through channels, to level squares encased with mud, where it is evaporated by the sun. Every year the hole is made in another place. The deepest holes are in the eastern portion of the basin, where the brine is reached at forty feet below the surface. To make pits, or examine the ground at great depth, by boreholes, has never been attempted. The prospect of finding a body of rocksalt would appear exceedingly favourable.

Each corporation produces yearly between 20 and 80 *ming* of salt, of 300 piculs each. If 50 *ming* is taken as the average, the yearly production would be 7,500 *ming*, or 2,250,000 piculs.* The first selling price is Tls. 350 per *ming*. The proprietor, before selling at this fixed price, has to pay duties to the amount of Tls. 160 per *ming;* besides, the purchaser is subjected to other duties, amounting to Tls. 60. The price of Tls. 350 is equal to about 20 cash a catty. The retail price in the neighbourhood is 30 cash, and it increases with the distance from the place of production. Wages at the saltworks are 90 cash and board.

These saltworks supply Shansi, northern Shensi, and the greater portions of Kansu and Honan. The amount of yearly extraction (supposing the figure arrived at to be correct) would hardly appear to be sufficient for the population of those regions. But there are some other sources of supply. In the valleys of Hin-chau, Tai-yuen-fu, Ping-yang-fu, Si-ngan-fu, in fact in every large loess-basin, salt is made. It is of very inferior quality, has a brown colour and a bitter taste. It is sold at a price ranging from 7 to 20 cash a catty, and only used by the poor. Some restrictions put upon its sale by the government are mentioned in my letter on Honan and Shansi. A portion of Shansi is also provided with salt from Tientsin.

13.—*FROM KIAI-CHAU TO TUNG-KWAN ON THE YELLOW RIVER.*

The city of Kiai-chau is situated at the western end of the salt-basin, and near the northern foot of the Fung-tiao-shan. West of it, a continuous orchard, thirty miles long, and from two to three miles wide, joins the descent of that mountainrange. Apples, pears, plums, persimmon, jujube are the principal fruit raised. Many villages are scattered between the trees. To the north extends a plain with some low ridges of loess. Westward, this plain is separated by a spit of loess from the narrow strip of level ground on which stands the city of Pu-chau-fu. And here we reach the Yellow River, just where it takes a long sweep to the west, preparatory to its great and sudden bend to the east. The concave bank, next to the river, is a broken edge of regenerated loess, commencing at a level with the Wei-River and ascending almost imperceptibly, but steadily, as the eye follows it northward along the Hwang-ho. On the convex side of the bend extends alluvial land, sandy and impregnated with salts near the river, but fertile at a little distance from it. A few miles below Pu-chau-fu, on the left bank of the Yellow River, stands the fortress of Tai-chin-kwan, in and around which thirty batallions of soldiers were stationed, to protect the passage over the Hwang-ho, which leads to Tung-chau-fu in Shensi. Twenty-five miles below Pu-chau-fu is the celebrated passage of the fortress of Tung-kwan, where the boundaries of Honan, Shansi and Shensi meet. I crossed the Hwang-ho at that place. The river was covered with floating ice, and the passage disagreable. The current was swift, the river shallow, the water muddy, of loess-colour. I estimated the width of the stream at, at least, 600 yards. I will describe the Tung-kwan gate in connection with the province of Shensi, but, before proceeding to this, add a few general notes regarding the province which we leave.

14.—*GENERAL REVIEW OF THE PROVINCE OF SHANSI.*

Configuration of surface.—In my first letter on Shansi, I have given a description of the configuration of the southern half of the province. It is, form a geological point of view, a plateau elevated from 5,000 to 6,000 feet above the level of the sea, made up of the horizontal strata of postcarboniferous sandstones, and surrounding the Ho-shan range, which rises to about 8,000 feet. But the character of the plateau, as a continuous tableland, is effaced by the action of the water, which has eroded in it deep channels and basins, down to the coalmeasures and the limestone, which underlie, in succession, the sandstone, at altitudes varying from 2,500 to 3,500 feet. To the south and east, the sandstone of the tableland is cut off completely, and makes room for the lower plateau which skirts the foot of the other, and consists of the limestone floor, and the coalmeasures resting on it.

* For the sake of comparison, it may be mentioned that Stassfurt and Wieliczka produce only about one-third of that quantity each. But it is hardly fair to compare the results of mines of rocksalt with those obtained from evaporating brine at the open air.

Here is the seat of the coal and iron industry of Tse-chau-fu, Lu-ngan-fu and Ping-ting-chau. The limestone constitutes the ragged descent from this lower tableland to the Great Plain, giving it, from below, the appearance of a mountainrange, which is known as the "Si-shan" or "Tai-hang-shan." It also reappears at the bottom of small but deep riverchannels, as well as of large eroded valleys of the interior, such as the basins of Tai-yuen-fu, Ping-yang-fu, Kiang-chau, and renders here, too, the coalbearing strata easily accessible. These yield anthracite east of the Ho-shanrange and its imaginary continuations north and south, and bituminous coal to the west of it.

This configuration continues west, across the three large basins and, probably, across the Yellow River, to Shensi. It continues also northwest of Tai-yuen-fu, and north, to the basin of Hin-chau, where the limestone floor rises to a higher level. The coalfields of Wu-tai-hien, Kwo-hien and Ning-wu-fu appear to be the last, in a northerly direction, which belong to this grand, little interrupted, and little disturbed expanse of highly productive coalformation, although it is possible that they are connected in the west with the coalfield of Ta-tung-fu.

East and north of the last mentioned places, this simple configuration ceases. We meet in northern Shansi with high mountainranges trending southwest and northeast, and made up of very ancient formations whose relative age is apparent from the fact, that Silurian beds rest horizontally on their highly disturbed strata. In the central line of Shansi, these mountainranges enclose between them wide depressions, but to the east they range closer, and give rise to an apparently complicated and certainly extremely wild country, which constitutes the descent from northern Shansi to the plain of Peking. To the west, too, there is a high mountainous country, which renders the approaches to the Yellow River difficult.

We have then, if we overlook the whole province, to the east, a very steep descent to the Great Plain, known as the Tai-hang-shan, while to the northeast the regions on the San-kang-ho merge into those of the department of Siuen-hwa-fu. Next to this descent follows a high mountainous country, in the southern half of which there is extensive coalmining, while the northern half consists chiefly of rocks preceding the coalformation in age. We arrive now at the central line of the province, along which, from north to south, there is arranged a curious series of deep depressions, all of them ancient lakebasins, immersed in loess, and filled with stratified soil, the surface of which is in each case a more or less extensive plain. This is the agricultural belt of Shansi. Yet, every basin, within the province, has also its large share of coal-bearing ground. The altitude of the basins diminishes as we proceed from north to south. The following figures are rough approximations to their elevations above the level of the sea, and only given to convey their order of gradual descent.

1st.—Basin of Tung-ching (beyond the Great Wall) 4,500 to 5,000 feet.
2nd.—Basin of Ta-tung-fu, 4,000 feet.
3rd.—Basin of Tai-chau and Hin-chau, 3,500 feet in its northern, 3,000 in its southern portion.
4th.—Basin of Tai-yuen-fu, 3,000 feet.
5th.—Basin of Ping-yang-fu, 1,800 feet.
6th.—Basin of Kiang-chau, 1,500 feet.
7th.—Basin of Kiai-chau, 1,200 feet.

This series of basins indicates, however, by no means a chain of lakes that were formerly connected with each other. Some of them are separated from those next adjoining by high dividing ridges, and they are drained by different rivers, and in different directions: the first and second by the San-kang-ho and its affluents, towards the plain of Peking; the third by the Pu-to-ho, which descends eastward towards the Great Plain and reaches it near Ching-ting-fu; the fourth, fifth and sixth are all situated on the Fuen-ho, an affluent of the Yellow River, but separated from each other by ridges consisting, in one case of limestone and loess, in the other of loess alone. The seventh is drained directly to the Yellow River, near the Tung-kwan.

West of the agricultural belt follows again a mountainous country, in which the coal-formation is a conspicuous feature everywhere. Judging from the mode of its position on the western edge of the basins, it appears to be little disturbed, and it is probable that, together with the strata enclosing it below and above, it crosses the Hwang-ho as a continuous sheet, eroded to a great extent, but seldom interrupted by other rocks, and that the underlying limestone gives origin to the wild gorges through which the river flows.

Roads.—One great cartroad leads through the province from north to south, and connects all the basins with each other. In every one of these, it spreads out into many channels, connecting all the cities and villages within it, and converging again into one road on the dividing ridges. From the east, two cartroads join this main trunk, one from Siuen-hwa-fu, which enters the plain of Ta-tung-fu, the other from Ching-ting-fu. The latter is the most important. To the west there is no outlet for carts, and to the south only one, at the great bend of the Yellow River. Apart from these roads, the province can be entered from east and south by several bridlepaths, some of which are used for a considerable local traffic. Only two are of importance for a more general trade. One of them follows the Puto-ho, from Hwo-lu-hien in Chili to Hin-chau. It is used for the traffic to the north, and many goods destined for Tai-yuen-fu go by it, to avoid the

duties which must be paid on the main road. The other bridlepath, from Hwai-king-fu in Honan, by way of Tse-chau-fu, Lu-ngan-fu and Tsin-chau, to Ping-yau-hien in the plain of Tai-yuen-fu, was mentioned in my first letter on Shansi (p. 13).

Passages of the Hwang-ho.—The Yellow River, where it forms the western boundary of Shansi, is not only unfit for navigation, excepting in portions of its course, and then only for small boats, but also difficult of access, and difficult to cross. Its inaccessibility, in the greater portion of its course, is demonstrated by the fact, that, although the river is frozen in winter, a few detachments of Imperial soldiers, stationed at the customary places of passage, were sufficient to prevent the Mahomedan rebels from invading the province of Shansi. North of the Tung-kwan bend, no important road of commerce goes across the river from east to west, although a small trade was always entertained in several places, and, in diminishing proportions, is still carried on after the devastation of Shensi. *Pau-te-chau* is the most important among them. I have mentioned in another chapter, that only a mountainous bridlepath leads to that place from the east. The passage will always retain some importance, as establishing the connection of Hwolu-hien with Yu-lin-fu in Shensi and the Ordos country. Higher up the river, *Toto* must be mentioned, the place of passage between Kwei-hwa-ching and the Ordos country. Both places are well known from the descriptions by Gerbillon, who crossed the Yellow River when accompanying the Emperor Kang-hi. Below Pau-te-chau, there are five or six unimportant places of passage, till we reach *Ki-chau*, a country which abounds in coal. At that place, the rebels succeeded once in crossing the river on the ice, and a strong garrison is stationed there since. The river is smooth at Ki-chau, and then enters the narrows which end at the Lung-men. Thence to Tung-kwan it is navigable. At the great bend there are, as I have mentioned, two crossings: that of *Tai-chin-kwan*, near Pu-chau-fu, which establishes the connection with Tung-chau-fu and the regions north of the Wei-River; the other is the passage of Tung-kwan, by which the main traffic between Shansi and Honan, and between Shansi and Si-ngan-fu takes place.

Products and population.—Shansi yields nothing for exportation but coal, iron, and salt. Its chief imports are cotton, cotton-goods, wheat, and opium. It produces these articles in a quality superior to that of the neighbouring provinces, but not in sufficient quantity for its own consumption. The altitude of its arable ground renders nearly the whole of it unfit for raising two crops a year. It is a current opinion in Shansi, that the imports exceed considerably the exports in value. I have stated this fact in particular in relation to the basins of Hin-chau and Tai-yuen-fu. It is also true of that of Ping-yang-fu. This valley exports a great deal of wheat and cotton to the north and east, but makes up the amount by, probably, larger imports of those articles from the south, and the gain it derives from the sale of tobacco, paper, and a few other abundant products is counterbalanced by the consumption of opium in excess of that raised in the valley itself, and the importation of foreign and southern produce. Yet, Shansi is considered a wealthy province, and there is probably no other region of equal extent in China where the small towns and villages consist of so substantially built and expensive houses as is the case in the plains of Tai-yuen-fu and Hin-chau. The capital with which their two and three-storied brick-buildings are constructed is, as I have repeatedly hinted at in the foregoing pages, the enterprising commercial spirit of the population; and it may indeed be said, that mental labour is the chief article of export from Shansi. Hundreds of thousands of the young men of the province work as clerks and book-keepers in the cities of Chili and Manchuria, leaving their families home. They return on leave every five or ten years, bringing with them their earnings. The remunerative commerce beyond the Great Wall, from Manchuria in the east to Ili in the west, appears to be almost exclusively in the hands of the Shansi men. And it is known, that they manage the banking business throughout the Empire. With the exception of banking, they cannot rival in the south with the men from Kiangsi in doing general commerce. These boast that they owe their success to cunning and skill in deceit, and blame the Shansi men for being too upright in their dealings. But to form a correct opinion of the commercial-spirit of the latter, the Mongols should be consulted, who would hardly give them so flattering a testimony.

Unpleasant experiences with the population are rare in travelling through Shansi. They are too intelligent, and too much of a matter-of-fact people as to form their opinion exclusively from vague rumours. I believed to notice a marked improvement in the spirit of the population towards foreigners, as compared with the experience on my previous journey, due, partly, to the logical conclusion (which few other Chinamen are able to draw), that people who supply them with so many useful articles of curious make and high finish cannot be altogether inferior to them, and partly, to the increased intercourse of Shansi merchants with foreigners, in Tientsin. Their favourable impressions, related in the roadside inns, spread rapidly.*

* Nothing has worked so forcibly in the interior of China to bring foreigners into general contempt, and nothing contributes so much to the insults to which the traveller is occasionally exposed, as the importation of stereoscopic pictures of a certain most vulgar class; and foreigners in China have no greater ennemies than those who have introduced them. They are exhibited by itinerant showmen, who travel with a stereoscopic apparatus. From the gates of Peking to the places before the temples at Si-ngan-fu, and to the remotest towns and villages, chiefly as far as the influence of Tientsin extends, I found them everywhere. Where that is the only source from which the natives are enabled to form their opinion of foreigners, how can it result in anything but the most profound contempt! Nothing but personal intercourse can wipe out these impressions.

NORTHERN SHENSI.

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1.—*GEOGRAPHICAL BIPARTITION OF THE PROVINCE OF SHENSI.*

SHENSI consists of two regions differing from each other in many essential respects. Two thirds of its area, lying north of the Tsing-ling-shan* range, belong to the basin of the Hwang-ho; the remaining one third is situated south of that range, and constitutes the upper half of the basin of the Han River, an affluent of the Yangtse. The watershed which, in the main, coincides with the highest summit-line of that range, is also a divide as regards the nature of the ground: it separates sharply the loess-region of the north from another to the south in which no loess occurs. The former resembles in every respect the northern provinces in general, while the basin of the Han differs much from them in character, and is closely allied to Sz'chwan. The difficulty of communication between the two portions of the province is so great, that either of them has played its independent part in the history of China. As regards recent events, the Taiping rebellion extended to the upper Han, and the rebels had possession of its valley during several years; but on two occasions only were raids by small roving bands made into northern Shensi. The Mahomedan rebellion, on the contrary, had its foothold in the north, and never spread south of the Tsing-ling-shan. As regards products and commercial intercourse, and in fact all practical questions, the two regions are just as strongly divided. It is therefore necessary to treat of each of them separately.

Northern Shensi comprised in former time all the territory situated between the north and south reach of the Hwang-ho to the east, the Great Wall to the north, and a line of high mountain-ranges to the south-west. When the Chinese Government deemed it necessary, and succeeded, to push the dominion of China proper beyond the Kia-yü-kwan gate in the Great Wall, and to annex that long and narrow strip of country which extends from there through the Gobi desert to the northern foot of the Tien-shan range, another province was created, by the name of "Kansu," and a completely arbitrary line drawn between it and that country which was left to "Shensi." At present, northern Shensi consists of the lower portion of the basin of the Wei River, and of the basins of a few other small affluents of the Hwang-ho. All historical, political, strategical, commercial, and social interests of northern Shensi centre in a large loess-basin, through which lies the lower course of the Wei River. It formed also for me the basis from which I drew my information regarding, not only the regions farther north, but also the province of Kansu. I will describe it in the following pages by the name of the "Wei Basin," and then dwell more particularly upon Si-ngan-fu, the great capital of the north-west of China. As regards the present political troubles of the country, their origin and history, I beg to refer to a letter on that subject which I addressed to your Secretary from Si-ngan-fu.

2.—*THE WEI BASIN.*

FORMATION OF SURFACE.

The Wei-ho is the greatest affluent of the Hwang-ho. In its lower course, it is a broad but shallow river, nagivable for very small boats from its mouth to Han-yang-hien. This is the name of a lively commercial place situated 14 miles west of Si-ngan-fu, and 140 miles, in an air line, from the mouth of the river. The Wei River is accompanied on its southern side, at the distance of from one to sixteen miles, by the steep descent of high mountain ranges. In some places it is separated from the rocky precipices only by a low and level terrace made up of strata of regenerated loess, and impregnated with alkaline salts; in others, true loess occupies the intermediate space, and covers the slopes to great altitude. North of the

* On foreign maps, the name "Tsing-ling" is used for this range. But it denotes only one of the passes by which it is crossed. The popular name for it throughout the surrounding country is "Tsing-ling-shan," besides the constantly recurring one of "Nan-shan." On many maps, the name of "Pe-ling" is still applied for the aggregate of all the ranges dividing the Yellow River from the Han. This name is of foreign invention, and should be completely dropped.

river, the ground rises at an extremely low angle, so slowly indeed that it has almost the appearance of being level, and must, in common language, be called a plain. As far as the eye can reach in that direction, it sees the vast extent of this gradually rising ground. All this is loess. In the distance, the uniformity of the surface is occasionally interrupted by slight swellings. They mark the position of ranges of hills covered with loess, and exposing their rocks only in gullies, and are the southern ends of long hilly spurs projecting from the higher, but (according to native statements) still loess-covered, ranges beyond. Going west, some of these spurs approach nearer to the Wei River, and finally, on the western boundary of the province, they almost join the Tsing-ling-shan. The slightly rising ground extends between the spurs far to the north-west, on both sides of every river. On the smaller rivers there is probably no alluvial soil at all, and the Wei River is accompanied by it in a few places only.

We are here, indeed, in the very centre of the loess region. As far as I have travelled in the Wei Basin, I have seen little else but loess; and it is evident from the description given to me of various portions of the province, that the whole of it, north of the Tsing-ling-shan ranges, is covered by an almost continuous sheet of loess of great thickness. Everything is yellow. The hills, the roads, the fields, the water of rivers and brooks are yellow, the houses are made of the yellow earth, the vegetation is covered with yellow dust, and whatever moves on the road shares, for the same reason, the general yellow colour; even the atmosphere is seldom free from a yellow haze, which is due to the diffusion through it of fine dust of loess. It is here where, if I am correctly informed, the word "hwang" (yellow) was first used as the symbol of the earth, and one of the most ancient of the Chinese Emperors adopted the title "Hwang-ti," that is "Lord of the Earth," or, as we may more fitly translate it, "Lord of the Loess." The word could never have originated in any of the southern provinces.

If the Wei Basin were more extensively examined, it would probably be found to exhibit all the features peculiar to loess-basins on the grandest scale and with the most perfect development, because no other loess-basin is so extensive, and no one appears to extend through equally wide ranges of altitude. In its lowest portions even, where it has the appearance of a plain, it is not lacking of those characteristics. All the rivers coming from the north, together with their tributaries, descend in channels, the vertical or terraced walls of which increase in height with the distance from the Wei River; and if they were followed higher up, they would be found ramifying into the loess in an infinite number of the wildest gullies. This merely theoretical supposition is fully confirmed by the description of the scenery near the headwaters of various rivers, as given by Gerbillon, native travellers, and the Emperor Kang-hi himself.

West of the head of navigation, the peculiar character of the loess is conspicuous in the immediate vicinity of the Wei River. The bottom of the loess-basin rises in that direction more rapidly than the bed of the river. Consequently, we see the latter flow in a channel immersed in the loess, and increasing in depth as we ascend the river. Below Pao-ki-hien the channel is 600 feet deep. Its northern bank rises from the strip of alluvial ground which accompanies the river, in a series of narrow terraces, the aggregate of which form a slope of from 35 to 50 degrees. Notwithstanding this steep inclination, every terrace is not only cultivated, but most of them are inhabited. The backwall is perforated with caves in which the people live, and long flights of steps excavated in the loess connect with each other the cave-villages situated at different levels. At a level with the top of the highest terrace extends the plain of Fung-tsiang-fu, with a continuous rise towards that city and beyond it, and cut by gullies which are extremely steep and narrow, but wide apart. West of Pao-ki-hien the even ground of the loess basin contracts, but then expands again, in the large basin of Tsin-chau, in Kansu, which is said by native travellers to exhibit the erosions on a much larger scale than the lower Wei Basin. Beyond it, the sources of the Wei River are soon approached. They are situated in the coal-region of Kung-chang-fu.

Geographical Situation.

The Wei Basin is the greatest agricultural country of the north-west. To this circumstance, next to its geographical position, it owes the prominent part which it has played in the history of China, and chiefly in its early epochs. Immediately on entering the Wei Basin from the east, the impression of its peculiar position is vividly conveyed. In the provinces of Honan, Chili, and Shantung, the interests and relations tending in the direction of the seaports and the marts on the lower Yangtse are largely prevailing. In vain

the traveller attempts to get any but the most superficial information as regards the regions to the far west. In Siuen-hwa-fu and northern Shansi, his looks, following the lines of practical interest, are directed towards Mongolia, while on the Han river they are turned to central China. On the Wei River, he finds himself suddenly arrived at a point of view from which he believes to see spread out before him, like a map, an immense portion of Central Asia, with its roads of commerce to Turkestan and Ili, its peculiar and quite exceptional political conditions, and its turbulent history, marked by the periodical fluctuation and displacement of nationalities, and spasmodic events, many of which resulted in an unparalleled destruction of human life. Most of these gigantic movements reacted powerfully upon the region of which the Wei basin forms the central and most important portion, and some of them actually extended with all their terrors till the Tung-kwan gate ; just as the last of these movements, that one enacted within the last decade, commenced near the Tung-kwan gate, and immediately spread to regions far west, while the east and south of China were never drawn into its sphere. It is on account of these intimate relations with the north-west, that from the Wei River, as a point of view, the phases of ancient Chinese history, the chief theatre of which was the Wei Basin itself, together with its eastern extension, the region of Kiai-chau and Ping-yang-fu, pass before our vision like a natural corollary to the geographical relations. We find in these the clue to the course of Chinese politics towards the west, to the fluctuations of their power in that direction, and they are suggestive of the course events may take in the future. A short survey of the geography of the surrounding regions will elucidate these remarks.

To the south, the Wei Basin is shut up precipitously by a barrier of mountains whose summits rise to from 5,000 to about 11,000 feet above the level of the sea. It consists of two parallel ranges, the *Fu-niu-shan* and the *Tsing-ling-shan*. I crossed the former, on a previous occasion, near its eastern end, in the Nan-chau passage*; its western terminus is at Lin-tung-hien, a few miles east of Si-ngan-fu, renowned as the burying place of the great Emperor Tsin-chi-hwang. It is joined on the northeast by the sacred *Hwa-shan* range. From Si-ngan-fu westward, the Tsing-ling-shan forms the southern boundary of the Wei Basin. It continues farther west into the unexplored mountainous region of Kokonor, and constitutes, with it, the easternmost outlier of that broad and almost unknown complex of very elevated mountain ranges which the Chinese designate, still farther west, with the name of the *Kwen-lun*. This outlier projects into China proper like a gigantic wedge, dividing north and south—Loess-China from the regions without loess. At Si-ngan-fu, the width of the wedge is already much reduced, as compared with regions farther west. Yet it is even here a formidable barrier. After having, for ages, impeded any but the most distant relations between the Wei Basin and the regions south of it, a connection with these was established about sixteen hundred years ago, by the construction of an artificial road across the Tsing-ling mountains to Han-chung-fu, which is to this day the only practicable route of travel and commerce between the north of China and the province of Sz'chwan. To the southeast, however, a natural road opens between the Funiu and Tsing-ling ranges to a navigable affluent of the Han River, the Tan-ho, which intersects the last-named range and empties into the Han at Lao-ho-kou. This passage is of great importance for the Wei Basin. It establishes an easy connection with a portion of Honan, and the provinces of Hupè, Hunan, Nganhwei, Kiangsu—in fact, the whole south-east of China.

The Wei Basin is nearly as effectually closed to the east. Here, the elevated table-land of Shansi, with its partial but almost unknown continuations into Shensi, connects the highlands of Mongolia with the mountainous regions of Honan. From Toto, in the neighbourhood of Kwei-hwa-ching, where the Yellow River, coming from the west, first approaches this elevated country, it seeks in vain for a place of egress to the east, until it finds it about six degrees of latitude farther south, at the Tung-kwan gate, which is, at the same time, the lowest place of the Wei basin. I have mentioned in another page, that no one great road of commerce leads across the river from west to east, for this whole distance. Like the river itself, the great commercial intercourse is restricted to the Tung-kwan gate, through which the connection is established with Shansi, Honan, Chili, and Shantung.

While to the south, high mountains, and to the east, a river flowing in rocky gorges and (probably) between deeply cut table-lands, form nearly impassable barriers, but still allow a passage on three quite distinct roads, the barrier which shuts in the Wei Basin on the north appears to be even more formidable, though it is much less conspicuous and differs totally in character from the others. According to the information

* Letter on Honan and Shansi, p. 4.

which I was able to gather, it is the loess, the *hwang-tu*, which causes there the difficulties, together with the situation, beyond it, of the inhospitable region of the Ordos Mongols, which fills out the great curve of the Yellow River. The *Ordos country*, as far as I am able to conclude from various information, has an elevated southern rim, which is approximately indicated by the line of the Great Wall, and divides the headwaters of several affluents of the Yellow River from a plateau without outward drainage covered with pasture. Those rivers, which descend towards the south, east, and west, have their origin in a great number of deep gullies, cut precipitously into loess. On the plateau, the water collects in inland basins, just as in Mongolia, and the growth of the loess is probably proceeding in them. The plateau diminishes in altitude towards the north. It terminates in this direction, as in all others, with the setting in of the outward drainage, and a belt of loess furrowed by gullies divides it from a low and undulating sandy region, which fills the innermost portion of the curve; it owes its existence probably to the action of the river, which has, since ages, worked on the destruction of the material along the outer curve of the great bend, and redeposited some of it on the opposite side. The river is, in those regions, a broad net of shallow channels, meandering between sand dunes, and it is asserted that, in one place, no river at all exists for many miles, the whole body of the water being sucked up by the sand.

Uninviting as those regions are by themselves, the approach to them from the south would be attended with the greatest difficulty. A glance at the distribution of the watercourses in Shensi, combined with the information, that all of them are cut in loess, or in mountains and tablelands covered with loess, must convince anyone acquainted with the nature of that formation, that traffic, north of Fu-chau, which appears to be the northern limit of the gentle surface of the Wei Basin, must be attended with great inconveniences. There are roads to Ya-ngan-fu and Yu-lin-fu, which is the place of supply and commerce for the Ordos Mongols, but they serve only for local trade. Difficulties of intercourse, and the absence of any important region of supply, co-operate to isolate the Wei Basin in that direction. The two greatest marts north of Shensi are Kwei-hwa-ching and Ning-hia-fu. Communication with the first takes place through the Tung-kwan gate and Shansi, with the other through Lan-chau-fu in Kansu.

It is towards the north-west, along the foot of the outliers of the Kwen-lun, that the chief interests and commercial relations are directed. I have called the boundary between Shensi and Kansu an arbitrary line. It appears that, if it followed the watershed of the Wei river and its affluents, it would still divide two regions closely allied to each other, as regards climate, nature of the soil, and scenery. Kansu is situated at a greater elevation, and has a much colder climate, than the Wei Basin. But this circumstance tends to make the tie between both closer, because Kansu must rely upon the Wei Basin as a basis of supply, for some essential products in which it is deficient. I will give, in another chapter, a few details regarding this subject and the prevailing tendency of traffic through Kansu to the far north-west.

POPULATION.

The Mahomedan rebellion has reduced northern Shensi so considerably, that it would not be doing justice to that country if one were to form an opinion in regard to it solely from its present state. Evidently, the Mahomedans have had the firm purpose to exterminate the entire pagan population and the destructible portion of their property. They made a wholesale slaughter of men, women and children, and destroyed villages and cities. Where mountains were in the neighbourhood, the inhabitants fled to them, if they were able to do so. But the movements of the rebels, who were on horseback, were so rapid and unexpected, that the proportion of those who were able to take refuge was small. The destruction was greatest in the central portion of the Wei Basin, on account of the great distance of the hills. Solid city-walls proved an efficient barrier, because the rebels had no artillery. Si-ngan-fu, Tung-chau-fu, and most of the *fu* cities, together with some *hiens* were saved. But a great many are destroyed. On the road from Tungkwan to Si-ngan-fu, every city has had that fate. In the villages not a house was left standing, those of the Christians excepted. The villages in the Wei basin were large and numerous; not one of them has escaped destruction. The temples in particular were most savagely dealt with. Even the caves in the loess were not spared, and their brick-fronts torn down. The destruction of life counts by millions.

Yet, Shensi is recovering from the blow. In the space of two years, which have elapsed since the Mahomedans left, the survivors have rebuilt their houses, and new cities are forming. It is a curious fact, that public buildings only are again erected within the old city walls. The people dislike the restriction put

upon them by the closing of the gates, and are building their new cities outside of these. They may also have learned by experience that, if the fortification is not strong and the gates are in possession of the enemy, the walls, far from being a protection, are an impediment to flight, and may, on the contrary, be the first cause, that no inhabitant can escape being killed. Immigration into Shensi has not yet commenced. But if the government would assist it, Hupè and Sz'chwan would give a large contingent, and other provinces would follow.

As regards the character of the population, the contrast between it and that of Shansi is very marked, on the high road. After having experienced pleasant treatment throughout that province, I was surprised to find the people very troublesome immediately after having crossed the Hwang-ho. From there to Si-ngan-fu, a great dislike of foreigners, and a decided vulgarity in the character of the people were conspicuous. This was no longer the case west of Si-ngan-fu, where I left the great military road to Kansu. The difference was so great, that I am inclined to ascribe it partly to the influence of the soldiers, although my direct intercourse with these was quite agreeable.

The inhabitants of Shensi are, in the main, an agricultural people, and are not given to any noteworthy industrial pursuits. Those who live in cities are not without enterprising commercial spirit. Similar to the Shansi men, they leave the province to do business elsewhere. In Sz'chwan they live in considerable numbers, and have a large portion of the commerce in their own hands.

Products and Climate.

Northern Shensi is exclusively an agricultural country, and enjoys the reputation of being among the most productive regions in China. In the Wei Basin, and extensive regions besides, two crops are raised, of which the staples are, wheat in winter, and cotton in summer. Being a loess-region, it is unfit for rice, with the exception of ravines in the hills, and in these it is planted. Kauliang, pulse, millet, maize, groundnut, are additional summer crops for home supply. Barley, beans, peas, lucerne, and chiefly, rapeseed and poppy, complete the list of the prominent winter crops. Hemp and tobacco are, too, extensively cultivated.

When speaking, in another page, of the, apparently, self-manuring faculty of the loess, I cited the Wei Basin as an illustration. It must strike every observer with surprise, to see a depopulated country cultivated throughout its extent, and made to yield a quantity of agricultural produce which cannot be much inferior to that which was raised when the country was still supporting a dense population. My experience is, of course, limited to the region adjoining the highroad and such by-ways as I took occasionally. I mentioned as the probable cause, the ease with which loess-ground is tilled, and its faculty to give satisfactory crops without other manure than a cover of loess taken from below the surface, provided the soil receives the rain it requires. The consequence is, an extraordinary abundance in good years, and, as with the moisture the manure fails, a complete famine in dry seasons. When such is the case, rice and other grain are imported from Hupè, prices are high, and the commerce of the province is prostrate. I happened to visit the Wei Basin after an unusually good season. The bread (if the steam-cooked "momo" deserves that name) had not for many years attained so large a size, and people were feasting in plenty. The troops, for which rice had been imported in quantity in the preceding years, lived entirely on wheat from Shensi. The abnormal excess of the ratio in which the extent of cultivated ground is to the number of inhabitants, in this as compared with previous years, and the probability that it will continue to exist, will have the effect to allow this state of ease and plenty to last for many years.

The instances are rare of the climate coming so much in aid of the natural fertility of the loess-ground as was the case in last year. From the data I was able to collect, it appears, that the climate of Shensi and Kansu is dryer than that of Shansi, while the neighbouring provinces of Chili and Honan would follow in ascending order, as regards the quantity of rain they receive. The destructive rains, which prevailed in Chili in the summer of 1871, extended through Siuen-hwa-fu to northern Shansi. The place of Tai-yuen-fu suffered much less, and as the Tung-kwan is approached the quantity of rain which fell in that year is found to have been less and less, until in the Wei Basin a region is reached, which received just the right quantity of rain required to produce that exceptionally favourable state of things which I have described. In relation to this subject, it is particularly worthy of note, that the heavy rain-fall which, about the middle of September,

lasted, at Peking, ten consecutive days and nights, spread far south-westward. On the Wu-tai-shan, its duration was a fortnight (11th to 24th September), at Tai-yuen-fu six days, and in Shensi only a beneficial rainfall is reported to have taken place in that season. Farther southwest, however, on the upper Han and in Sz'chwan, there happened again, at the same season, which is usually dry, an extraordinary fall of rain, lasting from six to eight days, the destructive effects of which I shall have to mention when speaking of Sz'chwan. The rains appear to have not extended southeast of that belt of provinces.

The winter is moderately cold, in northern Shensi, and not of long duration. The coldest portion of the Wei Basin is its lowest part, near the Tung-kwan gate. Snow falls a few times in winter, but disappears after some days, and assists the growth of the crops during the bright days which follow. I travelled in the Wei Basin in January, and did not suffer from cold. The sky was usually serene, the atmosphere hazy, and no strong winds did occur. The winters at Lan-chau-fu in Kansu are said to be considerably colder. A large portion of the troops were in winterquarters in the Wei Basin, and were to start for Kansu after Chinese New-Year, so as to arrive there after the coldest time.

Both provinces have no evergreen trees or shrubs, although bamboo is cultivated in wet places, in the Wei Basin. Fruit trees are plentiful. The one hundred-li-orchard on the northern foot of the Fung-tiao-shan continues west of Tung-kwan, to the northern foot of the picturesque granite-range of the Hwa-shan. An idea of the plenty of fruit can be formed from the fact, that persimmon *(Diospyros Kaki)* are sold in time of harvest, five for one cash, which is equal to 6,000 for one dollar.

Northern Shensi derives little benefit from its mineral produce. All places situated in the neighbourhood of the navigable portion of the Wei River are supplied with a superior kind of bituminous coal and coke from Ho-tsin-hien in Shansi. The locality is situated near the confluence of the Fuen-ho and Hwang-ho. The coal is put on boats, and distributed by them to Tung-kwan, Si-ngan-fu, and Han-yang-hien.

Yet, northern Shensi is full of coal. North of the Wei River, near Si-ngan-fu, the first low hills rise at the distance of from 30 to 40 miles, and though they are "tu-shan," that is, loess hills, the gullies are cut down into coalbearing strata which under-lie the loess. A dirty friable coal, full of sulphurets, is mined there for local consumption. Farther north, in the departments of Fu-chau, Ya-ngan-fu and Yu-lin-fu, the coalbearing ground was described to me as being very extensive, and good kinds of coal said to be extracted in numerous mines. But the difficulties of transportation put the coal entirely out of the reach of any place beyond the next surroundings. The mode of occurrence of the coal, in the bottom of ravines cut through the cover of loess is so similar to that of Shansi as to make it probable, that the tablelands of coalformation and postcarboniferous strata which spread from the Tai-hang-shan across the Fuen-ho towards the Yellow River extend over the greater portion of northern Shensi.

Mr. Pumpelly mentions, on the authority of native books, petroleum springs in Ya-ngan-fu. I received no information regarding them.

It is probable, that iron ore is diffused through the coalbearing strata, in a similar manner to that in which it occurs in Shansi. Yet, all the iron used is imported from that province, apparently because Shensi lacks anthracite and wood, with which alone the Chinese are able to smelt iron ore.

Salt, of an inferior kind, is made in a few places in northern Shansi, and can be purchased at nine cash a catty; but it is only used by the poorest people.

PLACES OF COMMERCE.

The Wei Basin has only one great place of commerce. It is Si-ngan-fu, the capital of the province. No other provincial capital in China, with the exception of Canton, is so perfectly the metropolis of an extensive region. Besides it, two other places are worthy of notice, namely, *Han-yang-hien*, which has a great portion of the Kansu-trade; and *Kwei-chin*, a populous mart situated 100 miles west of Si-ngan-fu, on the Wei-river, and important for the commerce with Han-chung-fu and Sz'chwan. But both places are, in a great measure, dependencies of Si-ngan-fu.

3.—*SI-NGAN-FU.*

The capital of Shensi has that in common with most other large Chinese cities that, in approaching it, one is not in the least aware of being so near a populous and great commercial place. No country resi-

dences or much increased traffic give evidence of it. In every respect, the country, with its destroyed villages, scanty population and general agriculture, continues just as before. All at a sudden, as if put there by the humour of some despot, rise the extensive walls which enclose bustling life. At Si-ngan-fu, the impression of artificial growth, so frequently conveyed by these walled squares when they stand in the midst of a plain, is relieved by the existence of extensive suburbs, which join the gates and are small walled towns themselves. That on the east-gate was destroyed by the rebels, but is nearly rebuilt. The gates of Si-ngan-fu are more magnificent than those of Peking, but the walls have not quite the colossal proportions of those of the capital of the Empire. They enclose a square of just ten li (six geographical miles) each side. They, and not the Imperial armies, have protected the city from invasion during eight years of Mahomedan rebellion. From 1868 to the summer of 1870 the rebels lay around the city, so as nearly to prevent any intercourse. Now, since the country is freed from its terrible enemy, the place has proved its vitality by the immediate revival of business. The immense reduction in number of the population of Shensi and Kansu, and the still continuing occupation of a portion of the latter province by the Mahomedans did of course not allow commerce to regain the dimensions it had before 1861 ; but even now it is not inconsiderable.

The cause of this vitality is this, that Si-ngan-fu occupies a dominant position, such as few inland cities enjoy that are not built at the places of confluence of navigable rivers. It is situated at the confluence of those few roads of traffic which, as I have pointed out, are the only possible connections for mediating the intercourse between the Wei Basin and the eastern and northern provinces, and occupy therefore indeed, in some measure, the place of rivers. Here converge, like rays in a focus, the three eastern roads, the Shansi-road, the Honan-road, and the Hupè-road, while from the southwest they are met by the Sz'chwan road. On the other hand, spread out from here the various channels for collecting the trade, and directing all political life, of Shensi and Kansu, and for keeping up the relations of whatever kind between China and Central Asia north of Tibet. It is this remarkable position which has made Si-ngan-fu the capital of the Empire in ancient time. The Chou-dynasty (1122 to 249 B.C.) is believed by the Shensi people to have resided at Fung-tsiang-fu, 120 miles west of Si-ngan-fu. The great despot Tsin-chi-hwang (246 to 202 B.C.)—the same who commenced to build the Great Wall, first against the Hiongnu who lived in what is now the Ordos country, and then in greater extent east and west ; who consolidated for the first time into one Empire nearly the whole of what is now China proper, including Sz'-chwan; and who burnt the books of Confucius, together with some hundred scholars who possessed most knowledge of them—was the first to remove his residence to the immediate vicinity of that place where now stands Si-ngan-fu. The military exploits which he was enabled to execute from it, made the name of the Tsin great throughout Asia. Afterwards the first fourteen Emperors of the Han dynasty resided at Si-ngan-fu. This family occupied the throne from 202 B.C. to 221 A.C., but the last twelve Emperors resided at Loyang, near Ho-nan-fu. The Huns commenced then to be supreme at Si-ngan-fu, where they ruled, by the name of the (second) Chou-dynasty. This was till 352 A.C. The dynasties of the Tang (618 to 905) and Sung (960 to 1127) resided at Si-ngan-fu. Thus, during more than 2,000 years, with some intervals, was this city, or its vicinity, the residence of the rulers, either of portions, or of the whole, of the Chinese Empire. Among the Emperors who made it the capital were not only some of the most powerful in the history of China, but some of those who are till now held in profound veneration on account of their wise and just rule.

While the aggressive power of the Emperors was chiefly exerted in the directions to the east and south, they had always to keep on the defence towards the north and west. The fine wheat crops of the Wei Basin must certainly have been attractive to the people living in the deserts or on the cold pasture grounds which spread in those directions. They made repeated invasions into the territory of Shensi, and it appears that the Wei Basin has seen alternately periods of high prosperity and of perfect decay, and that the immense destruction of life exerted by the Mahomedans was not the first instance of that kind during its history. Around Si-ngan-fu, there are constantly dug up from the soil, not only curious coins of various of the ancient dynasties, but bronzes which date from the first Chou-dynasty and are not surpassed in taste and finish by the productions of later periods. The antiquarian finds in no place in China so much opportunity for collecting objects of interest as on the classical soil of the Wei Basin. At a comparatively recent epoch of Chinese history, during the Tang-dynasty, arts and sciences flourished at the court of Chang-ngan, the present Si-ngan-fu. Dr. W. Williams says of this celebrated line of princes : " during the 287 years they held the throne, China was probably the most civilized country on earth, and the darkest days of the west formed the brightest era of the East." Si-ngan-fu was the centre of that country.

The city has retained to this day something of its political importance and may be called the capital of the north-west. It may be temporarily reduced in importance by events such as those of the last decade, but it cannot lose it, and will revive after every blow.

The population is said to be about one million, including 50,000 Mahomedans. These were formerly thriving citizens, but, being forbidden to leave the city, are restrained from commerce and reduced to poverty. Their fortunes have been taken from them by squeezes, and they live now on very subordinate occupations. The pagan inhabitants are aware of the dangerous enemy they harbour among them, and only prevented by the mandarins from killing all Mahomedans. If the number of inhabitants is correctly given, Si-ngan-fu is now probably the largest and most populous city in China, next to Peking and Canton.

ROADS OF COMMERCE COMMANDED BY SI-NGAN-FU.

1*st.*—*The Tung-kwan road.*—This road leads in an easterly direction over nearly level ground to the Tung-kwan gate, a distance of 310 *li*, or 86 miles.* In its last portion it is accompanied on the south by the highly picturesque granite range of the Hwa-shan, which terminates suddenly. Just opposite its termination commences, in the northeast, at 15 miles distance, the granite range of the Fung-tiao-shan, which thence stretches east-northeast. The two steep ends are connected by a concave line of very gentle curvature. It is the section of the surface of a trough of loess, which thence continues east. To the west, the loess is cut off abruptly by an almost vertical face along the line which connects the two granite ranges, and this face is joined on the west by a plain which is about 400 feet lower than the centre of the trough, and about 1,500 feet lower than its sides. That plain is the lowest portion of the Wei Basin. In it, the Yellow River makes its great bend, and receives the Wei River from the west. The united river, in approaching the loess-face, is not stowed up on it, as it may have been in former time, but breaks through the loess in a narrow passage. These are the narrows of Tung-kwan, so called from a fort erected at, or rather in, the mouth of the gorge, on the south-side of the river. The fortress encloses a city, and has two magnificent gates, through which all the traffic going eastward from Si-ngan-fu must necessarily pass. Beyond the second gate, the river is crossed on boats, by those who go to Shansi; the road to Honan goes straight on. While the approach of the gates from the west is perfectly easy, all the inconveniences with which loess obstructs intercourse are at once met with east of them. The whole road to Honan-fu appears to consist in a series of the most difficult crossings of loess-ridges and loess-ravines, and to be one of the most trying pieces of cart-road in China. The Hwangho washes, alternately, the steep banks of loess on either side, and leaves no room for a footpath along its banks. Some circuitous trails may exist which allow to go from the Wei Basin to Honan-fu, without passing the Tung-kwan, but they are certainly too difficult for commercial traffic, and too unsafe for military purposes, because a garrison at Tung-kwan can easily defend the narrow passages which the gorges in the loess may allow between it and the Hwa-shan. The fortress of Tung-kwan forms indeed most effectually the eastern gate of Shensi and Kansu, and its possession is, strategically, the key to those provinces, as it was formerly the key to the east for those Emperors or usurpers who were in possession of Shensi.

For going to Shansi, it is not necessary to pass through the fortress. I have mentioned the second crossing of the Hwang-ho at the fortress at Tai-ching-kwan, a little distance higher up the river. It is mentioned by Marco Polo, and probably the place where he went across. Through Shansi lies the high-road from Si-ngan-fu to Peking, Chang-kia-kou and Kwei-hwa-ching.

The only foreign port that is slightly interested in the Tung-kwan roads is Tientsin. Commerce between that place and Si-ngan-fu is possible by two ways. Starting from Tientsin, the first is by Hwo-lu-hien, the plain of Tai-yuen-fu, and Ping-yang-fu, the other by Tau-kou-chin and Ho-nan-fu.† Both appear

* Of the *li* of Shensi 250 are equal to one degree.

† The distances on these roads are as follows:

1. Si-ngan-fu to Tai-yuen-fu 1,440 *li*; freight on carts, including hong charges, can be had at Tls. 2.8.0 per picul.
   Si-ngan-fu to Hwo-lu-hien 2,000 *li*; freight from Tls. 3.8.0 to Tls. 4.5.0, with carts; and Tls. 5 to 6 with mules.
   Si-ngan-fu, via Hwo-lu-hien to Tientsin, 2,660 *li*; freight between the two latter places is Tls. 0.6.0 per picul, part of the journey being made by water.
2. Si-ngan-fu to Honan-fu 1,000 *li*.
   Si-ngan-fu to Tau-kou-chin 1,500 *li*.
   From Tau-kou-chin to Tientsin, a distance of 1,200 *li*, goods go by water, at a very low rate. (See letter on Honan and Shansi p. 6.)

to have been in practice during the Taiping rebellion, and are still used for a small portion of the Shensi trade; but neither of them will be able, hereafter, to compete with the Lao-ho-kou road. The northernmost portion of Shensi, however, chiefly the department of Yu-lin-fu, will probably continue to receive some supplies from Tientsin, via Hwolu, Hin-chau, So-chau, and Pau-te-chau.

The Tung-kwan road is of supreme importance in a political and strategical respect, as it mediates, without exception, the entire traffic between the southwest of the Empire (Sz'chwan, Yünnan and Tibet) and Peking, together with the whole northeast. It is one of the chief roads of travel in China, and the greatest military road. Mandarins going to Court, or to the examinations in Peking, are constantly moving on it, and it is the way taken by the majority of the tribute-bearers. It mediates, too, the direct through-trade, consisting mostly in articles of much value in proportion to their bulk, which exists between Sz'chwan and Kan-su in the west, and Peking in the east.

2*d.*—*Lao-ho-kou road.*—Starting from the east-gate of the city of Si-ngan-fu, this road follows the Ta-sui-ho, a tributary of the Wei-ho, and leads over a convenient pass to *Shang-chau.* From there it goes to *Lung-kiü-tsai*, a Custom's station of Shensi, situated on the Tan-ho. This place is at five days journey from Si-ngan-fu, and can be reached by carts. Boats can come up to it from the other side at high water only. When the river is low, land-travel must be continued two days further, to *Ting-tse-kwan*, a Custom's station of Honan. From there the river is always navigable. Another road is, from Shang-chau to *Man-chang-kwan*, six days from Si-ngan-fu. That place is situated on a larger river, which is always navigable, but the land-road to it is not so convenient as that to the two other places. The descent from each one of the three shipping marts to Lao-ho-kou on the Han river is made in about four days. From twelve to sixteen days are required up-stream. The whole journey from Si-ngan-fu to Han-kau can be made in twenty days, but from forty to sixty days are required for the trip in the opposite direction, if made by water; by land it can be executed in twenty-three days. Freight from Lao-ho-kou to Si-ngan-fu is Tls. 1.2.0 per picul, from Hankau to Si-ngan-fu about Tls. 1.4.0. The ease and cheapness of transportation put this road far a-head of those which pass the Tung-kwan gate, as far as the supply of Si-ngan-fu with southern produce and foreign goods is concerned.

3*d.*—*Road to Han-chung-fu and Sz'chwan.*—As a subsequent chapter shall contain some particulars regarding this road, I will here only mention its existence.

4*th.*—*Road to Kansu and Central Asia.*—There are two roads from Si-ngan-fu to *Lan-chau-fu*, the capital of Kansu. The common cartroad goes by Pin-chau and Ping-liang-fu. It is said to be a convenient road, without any difficult passage. The other passes through Fung-tsiang-fu, Tsin-chau, Ling-tao-fu. It is described as mountainous and difficult, and only practicable for pack-animals. At present, both roads are used for military purposes. The commercial traffic seeks small and circuitous by-paths, to avoid the rebels and, even more, the Imperial soldiers. The distance to Lan-chau-fu is 1470 *li*, which are divided into 18 *tsan* or stations. Here the Yellow River is crossed for the last time. Beyond it, one road follows the river down to *Ning-hia-fu*, a city which has lost its ancient importance, but is still a place of considerable trade for the Oeloet and Ordos Mongols. Another goes west, to *Si-ning-fu* (260 *li*), and from there to Lhassa (3,600 *li*). Although Si-ning-fu is an exceedingly lively place, and a great trading centre for the people of Kokonor, who bring there the produce of their mountains, such as rhubarb, musk, yak-tails, medicines of various descriptions, the further road to Lhassa appears not to be of any commercial importance. What Tibet needs of Chinese produce, it receives from Sz'chwan.

Both these roads are insignificant, as compared with the third, which goes from Lan-chau-fu, in a north-westerly direction, to Liang-chau-fu, Kan-chau-fu and Su-chau, and thence through the Kia-yü-kwan gate of the Great Wall to Hami, on the eastern end of the Tien-shan range. There it forks into two branches, the *Tien-shan Nan-lu* and the *Tien-shan Pe-lu*, which follow, respectively, the southern and the northern foot of that gigantic mountain-range, and lead through regions which derive their comprehensive political names, in Chinese, from those of the two roads.

It is the merit of Abel Rémusat and Carl Ritter, to have demonstrated the remarkable nature of the lines followed by these great western roads. Between the colossal mountains of the Kwen-lun system, which form an almost impassable barrier to the south, and are inhabited by a mixture of tribes most of which are considered to be of the Tibetan family, and the elevated desert which stretches boundless to the

north, and is inhabited by the Oeloet, an East-Turkish tribe, a narrow channel extends in a north-westerly direction from Lan-chau-fu, hundreds of miles long, and sometimes no more than a few miles wide, with level bottom and much fertile ground. Its western end is the key to Central Asia, for, immediately beyond it, commences the sandy plain of the Gobi Desert. The Oasis of Hami is then reached, and beyond it, level or undulating ground (slightly interrupted by hills on the north) extends on either side of the Tien-shan range. But only a narrow strip on the southern slope, which is little exceeded in width by another on the northern slope, are fit for agriculture. The rest is, desert on the south, and pasture ground on the north. Along the southern strip, the road goes on from Hami to Yarkand, Kashgar and Khoten; and along the northern, to Barkul and Ili-ho or Kuldja, near the present Russian frontier.

Since time immemorial, commerce has found out the natural road from Lan-chau-fu to Su-chau, and its further continuation and bifurcation. Along the Nan-lu, the fame of the Tsin dynasty spread to the Persians and Romans. Fourteen centuries afterwards Marco Polo travelled on it to Lan-chau-fu, to go thence by Ning-hia-fu and Kwei-hwa-ching to the residence of Kublai-khan. The Chinese Emperors were, at an early period of history, awake to the importance of the possession of these channels of international traffic, because it gave them the dominion of Central Asia. That portion, chiefly, between Lan-chau-fu and the Kia-yü-kwan, has, since two thousand years, been defended with the utmost pertinacity, and not unfrequently at a great sacrifice, not only because it is the only military road to countries at a farther distance, but also because, by having possession of it, the Chinese kept their western enemies, the Oeloet (who were formerly much more numerous than they are now) and the mountain tribes of Kokonor asunder. In settling that strip with colonies, they drove a wedge between those two nationalities, which, it was feared, would at once make common cause against China, if the possession of that narrow passage were abandoned. To strengthen the position, the Great Wall was pushed a-head along the north side of the channel, so as to divide this from the steppe of the Oeloet. Where the channel ends to the west, the Kia-yü-kwan gate was built. In many epochs of its history, the Chinese Empire was effectually locked up, by closing that gate, and opening it expressly for those only who had permission to enter.

Since the time when the Emperor Hia-wu-ti of the Han dynasty, nearly 2,000 years ago, first extended the supremacy of Chinese rule to the frontiers of India, Persia and Bokhara, and, with the view of strengthening it, established Chinese colonies and Chinese highroads lined with cities through the whole extent from Kansu to the far West, the tendency has prevailed to preserve those distant boundaries. Alternately, succeeding Emperors had to relinquish their hold of the regions beyond the Kia-yü-kwan gate, and contrived to re-establish it, but at no time did they lose complete possession of the channel east of that gate. The present dynasty succeeded in establishing the rule in the far West firmer than any other before, and Kien-lung could undertake to extend the boundaries of China Proper to Ili, and to embody the whole Pelu into the province of Kansu (in 1757.) Commercial relations were more flourishing than they had probably ever been before, when the Mahomedan rebellion broke out, and the Chinese lost (in 1865) not only the whole of the Tien-shan Nanlu, and Pelu, but also the Kia-yü-kwan gate, and that whole portion of Kansu situated beyond Lan-chau-fu.

These considerations will show of what vital importance, from a political and strategical point of view, is for the Chinese the re-establishing of their power, at least to the Kia-yü-kwan; and I have already pointed out, in the letter referred to above, that they will probably succeed, not only in this object, but also in regaining supremacy, for some time at least, of portions of the Nanlu and Pelu. The commerce to those regions will then revive immediately, and it may soon take larger dimensions than before, on account of the advance of the Russian dominion from the west.

A small itinerary, printed for the use of travellers at Si-ngan-fu, gives the following distances:

From Si-ngan-fu to Lan-chau-fu	1,470 *li.*	
„ Lan-chau-fu to Su-chau	1,450 „	
„ Su-chau to Hami	1,560 „	
Total from Si-ngan-fu to Hami		4,480 *li.*
Tien-shan Pelu:		
From Hami to Barkul	330 *li.*	
„ Barkul to Ili-ho (Kuldja)	3,210 „	
Total from Si-ngan-fu to Ili-ho		8,020 *li.*

Tien-shan Nanlu :

From Hami to Pidjan	980 *li.*	
„ Pidjan to Turfan	240 „	
„ Turfan to Ku-chě	1,690 „	
„ Ku-chě to Aksu	690 „	
„ Aksu to Yarkand	1,170 „	
Total from Si-ngan-fu to Yarkand		9,250 *li.*

The following distances complete the table :

From Yarkand to Kashgar	490 *li.*
„ Yarkand to Khoten	650 „
„ Aksu to Ushi	240 „
„ Aksu to Ili-ho (by direct mountain-road)	1,040 „
„ Turfan to Urumtsi	490 „
„ Barkul to Pidjan	160 „

It is not stated what kind of *li* is meant. If it is the larger one (200 to one degree), then the distance from Si-ngan-fu to Ili-ho is 2,773 statute miles, and that to Yarkand 3,198 miles.

To travel these great distances is not at all considered any great enterprise in Si-ngan-fu, and it was indeed simple and easy work until the time of the rebellion. Camels were little employed, and carts the usual means of conveyance, for travelling as well as for the transportation of goods. In making contracts, the time to Ili-ho was calculated at 80 stations, of 100 *li* each, although, practically, more than 80 days were required for the journey. A cart was hired at Si-ngan-fu for the entire distance. A two-mule cart, with a load of 500 catties and two or three passengers, or 800 catties without passengers, was hired at the price of Tls. 0.8.0 per station, or Tls. 64 for the entire distance. This is equal to the rate of 2.24 copper cash per catty for every 100 *li*, which is extremely low even in China. Food for men and animals is said to have been very cheap along the road, chiefly beyond the Kia-yü-kwan. Of that portion of the road going through the Gobi Desert, only three days were through a completely arid and waterless region. Some travellers report with a shudder of the horrors of passing it on a stormy day in winter ; others went through it with perfect ease. The people along the Nanlu and Pelu are described as extraordinarily goodnatured, and much better men than the inhabitants of Shensi.

From the fact, that the stations are calculated at 100 *li* each, and that two horses or mules only are employed for a load of 800 catties on so long a journey, it follows, that the road is easy throughout, and this is corroborated by those who travelled over it. The steepest grades are probably between Si-ngan-fu and Lan-chau-fu, where the stations are comparatively short. Beyond the valley-ground on the Yellow River, the road enters a natural gate, apparently formed of loess, and then rises gradually towards Liang-chau-fu. Till a short distance east of that place continues, as I was told, "the yellow earth, which is everywhere cultivated, and lies so thick that it is cut by deep gullies, and is inhabited by men who live in caves." This is an unmistakeable description of loess. It ends with the last affluent of the Yellow River. From Liang-chau-fu, level ground begins, consisting partly of sand and pebbles, and partly of fertile soil. The narrow belt which constitutes the departments of Kan-chau-fu and Su-chau is reported to be a very productive region and to abound in grain. Agriculture ceases to be general with the approach to the Kia-yü-kwan ; but patches of ground are cultivated beyond it. Hami is a level oasis, the beauties of which have often been extolled. The Nanlu is a warm and very productive country, abounding in wheat and cotton ; the Pelu is much colder, but agricultural products are plentiful and cheap. The Chinese inhabit the cities, where they are merchants and artisans, and they cultivate the soil. To their industry is due, according to all accounts, the productivity of the two agricultural belts which skirt the foot of the Tien-shan on either side. Many Chinese returned to Shensi and other provinces, as soon as the rebellion broke out. But Jakub Beg, the present ruler of Yarkand and the Nanlu, whose power extends to Hami in the east, treated those who remained so considerately, that they were induced to continue in their occupations. Afterwards, however, attempts were made to force them to adopt the Mahomedan faith.

Little doubt can exist that, eventually, China will be connected with Europe by rail. No direct connection of this kind is possible south of the Wei Basin, and any road to the north of it would have to keep entirely north of the Yellow River, and run altogether through desert countries. The same reasons

which have confined the commerce of China with the far West, during thousands of years, to the natural road which I have described in the foregoing pages, will be decisive for the establishment of steam-communication. As regards natural facilities, and the supply, at both ends of the line, of populous, productive and large commercial countries, the only line which ever can come into consideration is that by Si-ngan-fu*, Lan-chau-fu, Su-chau and Hami. It is a remarkable coincidence, that this whole road, including the Pelu, is well provided with coal. Kansu is reported to rival with Shansi as regards the richness and extent of its coal-fields. No department of the province, north of the Tsing-ling-shan, appears to be deficient of coal, and in some of them a superabundance of it is said to exist. I am told that anthracite does not occur in that province, but that bituminous coal is mined, in many localities, in large blocks and burns with very little smoke and smell. One intelligent informant, a native catholic priest who has travelled extensively in the Nanlu and Pelu, asserts, that from Lan-chau-fu to Hami coal is used for domestic purposes at every station on the road, and that the same is true of the whole extent of the Pelu. No coal exists on the Nanlu, where brushwood and grass are applied in its place. The region which is supplied from a coal-mine, in China, by land-transport alone, has scarcely in any case a radius of more than 300 *li* from the place of extraction. If full credence is given to the statement, we are therefore bound to assume, that the coal-formation extends, with few interruptions, from eastern Shansi to Ili, through thirty degrees of longitude. There is scarcely an instance on record, where so many favourable and essential conditions co-operate to concentrate all future intercourse on so long a line upon one single and definite channel.

Commerce of Si-ngan-fu.

The chief trade of Si-ngan-fu, in normal times, consists in the importation of silk from Chekiang and Sz'chwan, tea from Hupè and Hunan, sugar from Sz'chwan, and the exportation of this merchandize, together with a few other articles, to Kansu, Turkistan, Ili, and Russia. The trade in each of these articles is said to have been very large and yielded good profits. It is the chief foundation of the wealth of the commercial houses in Si-ngan-fu.

Shensi itself produces nothing for the foreign trade. Of its own products it sends to Shansi, cotton, wheat and opium, in return for coal, iron and salt. Kansu takes cotton and wheat, and sends back tobacco, medicines, chiefly rhubarb, furs, skins, wool, felt, mules, cattle, sheep. Some of these articles are got from the Mongols and from Kokonor, in exchange for cotton, tea, tobacco, &c.

Han-chung-fu and Sz'chwan are provided from Shensi with cotton, wool, skins and furs. Han-chung-fu sends rice in return, Sz'chwan gives sugar, silk and opium.

The direct imports from Hupè are chiefly tea, cotton piece goods of native manufacture, and rice. Han-kau sends foreign goods, which take a prominent place at Si-ngan-fu, paper from Kiang-si and Hunan, porcelain from Kiang-si. The silk trade with Chekiang is done directly in Hang-chau-fu and Su-chau-fu, by Shensi merchants. The exports from Si-ngan-fu, in the direction of Hupè, are not considerable. Rhubarb and medicines, which are mostly sent directly to Siang-tan and Canton, take probably the first place; opium, wool, and furs range next.

Most of these articles of commerce are of no direct interest for foreign commerce. Several of them deserve, however, a passing notice.

Opium is foremost among them, because in the product of Shensi the foreign opium has a dangerous rival. Although much inferior to Indian, as all Chinese opium is, its properties are much esteemed by the smokers. At Si-ngan-fu, the price of one tael's weight of opium is—of "Sz'chwan" Tls. 0.2.0, of "Kansu" Tls. 0.4.0, and of "Shensi" Tls. 0.2.8. Indian opium is imported in tins of 1 tael's weight from Canton, and sold at Tls. 10 per tin, but is very little used. Opium from Honan and Shansi is not sold at Si-ngan-fu. The former ranges in value between "Sz'chwan" and "Shansi," while "Shansi" is only inferior to that from Kansu. The most correct idea of the relative value of the opium grown in different provinces is

* When speaking on this subject on a previous occasion (letter on Honan and Shansi p. 12), I considered the passage of Honan-fu as the only possible approach to Si-ngan-fu. It is undoubtedly the most important. But possibly another approach may be feasible, following approximately the Lao-ho-kou-route.

probably formed, if the first price at the place of production alone is considered. From this point of view we arrive at the following order :

Original price of	Opium in	Kansu about	...	...	...	Tls. 0.3.8	per tael.
Do.	do.	Shansi	...	...	...	„ 0.3.3	„
Do.	do.	Shensi	...	...	...	„ 0.2.8	„
Do.	do.	Sz'chwan	...	...	...	„ 0.1.2	„

Considering the relative prices of equal weights alone, and not the weight of opium yielded on an equal area of ground (of which it is very difficult to get correct figures), the cultivation of the poppy would appear to be far more remunerative in the north than in the south. But another item must be considered, which is, the relative value of the crop which the poppy replaces. In the cold climate of Shansi, the poppy does only thrive on the best fields, on those which are level and can be irrigated. It occupies probably the larger portion of the best gardenland, where it replaces a certain and prolific wheat crop or the more valuable vegetables. No opium is exported from the province, and the drug is furnished to the smokers at three times the price at which those of Sz'chwan get it. In addition, a considerable amount of opium is imported from the neighbouring provinces. The planting of the poppy must, therefore, be considered, in Shansi, as highly injurious for the economy of the province, and as impoverishing the population. I will show, when speaking of Sz'chwan, that there and in Yünnan, the poppy replaces crops of inferior value. Kansu shares the climate and soil of Shansi. Under equal circumstances the cultivation of the poppy should be there just as injurious as in Shansi. But the population being small, and the arable land extensive, Kansu does not consume all the opium it produces, but exports considerable quantities of it both west and east, and imports none ; the poppy is therefore, probably, a valuable and beneficial crop. In both provinces the cultivation is not likely to increase much beyond its present state. Shensi is much more favourably situated in this respect, because the poppy thrives on loess-fields which are not irrigated. In the departments of Kien-chau and Fung-tsiang-fu, the lower portion of the loess-basin consists of rolling ground, which is interrupted by a few deep gullies. The poppy is not cultivated on the top of the swelling ground, which is too dry. But every slope, however gentle its inclination, is terraced. Those terraces which are well shut in on two or three sides are selected for the poppy. I saw extensive fields cultivated with it, and in some portions of the country it formed the most conspicuous winter-crop next to wheat. In this case, the poppy takes the place of an ordinary and uncertain crop of wheat, peas, beans, or rapeseed ; and as the opium is a much more valuable crop than these and is largely exported, its planting is perfectly justified from the standpoint of common economy. The area of the fields planted with poppy will rather increase than decrease. As regards the attempts on the part of the Government to check its cultivation, it appears that no power would be able to stop now the production of a narcotic for which the people have attained a craving. They are unanimous in the accusation, that the mandarins were the first, in every province, to smoke opium, and that the greatest relative number of smokers is still found in the yamêns. If the higher authorities were earnest in their efforts to suppress the cultivation, they would still be impotent to check the venality of their subordinates. And if that could be encountered, the people would revolt. An instance of this kind was related to me in a district of Ping-yang-fu, which produces much opium. An extra tax of 400 cash is there levied from every mow planted with the poppy. In 1870, the money was not paid. Before harvest time, the district mandarin sent out his men, and had the pods of all the poppy-plants cut off. In the following year, the tax remaining unpaid, the men of the yamên returned, to repeat the destruction. But the people of the whole district made armed resistance and drove them off. They collected then their opium, without paying any duties.

Wheat.—This is the staple of Northern Shensi. It is exported to Shansi, Han-chung-fu, Kansu, Kokonor, and influences the provincial commerce more than anything else, on account of the great fluctuation of its price. At the end of 1871, the price of wheat-flour was one Tael per picul. In 1870 it was Tls. 3.3.0, and in 1869 it had reached as high a figure as Tls. 6.6.0 per picul. The flour is the finest and whitest I have seen in China.

Cotton was sold in 1871 at Tls. 13 to 14 per picul. Although the amount raised is very large, the demand for it from Shansi, the northernmost departments of Shensi, Kansu, the Mongol and Oeloet countries, Kokonor, Han-chungfu, and Sz'chwan, is so great, that considerable quantities must be imported, besides, from Honan.

Tobacco.—The production of Shensi is large, but of inferior kind, and sold at Tls. 3.2.0 per picul. Tobacco is the most valuable product of Kansu, chiefly the "sui-yen" or waterpipe tobacco of Lan-chau-fu, which is sold at Tls. 26 per picul. It is brought in great quantity to Han-yang-hien near Si-ngan-fu, and sent from there to all provinces of the Empire. Notwithstanding the troubled state of Kansu, I met many mule-trains loaden with that valuable product.

Provincial Trade.—Si-ngan-fu does nearly all the collecting and distributing trade of northern Shensi. Good wagon-roads go off to the west, north and east, and connect the cities of the Wei Basin (between 35 and 45 in number) with Si-ngan-fu. Farther away, there are bridle-paths. I have observed in another page, that some districts of the northeast are more naturally supplied from Tientsin, via Hwolu-hien. Much of the provincial trade of Kansu centres, too, directly in Si-ngan-fu, without the interference of Lan-chau-fu.

Transit Trade.—From the preceding review of the great trade-roads to Western Asia it is evident, what extensive tracts of territory are there dependent as to their supplies on Si-ngan-fu. The population of those regions is thin, but the people throughout the North and West are great consumers of tea. Sugar and silk were sent not only to Central Asia, but through Ili to Russia. The import trade from the remoter regions in the West was small. "Russian goods" and medicines formed the bulk of it, and when that freight could not be procured, a load of the celebrated dried melons of Hami was taken back by the carts returning to Si-ngan-fu. I will here mention only in passing another article of trade, which is in itself of little commercial value, but appears to have influenced, in early ages, the intercourse with the West more forcibly than anything else. It is the yü or jade-stone, which is found in Khoten, and came to China through Kansu.

The transit-trade between the South and the Northwest was always entirely in the hands of the merchants of Si-ngan-fu. Another direct through trade was and is carried on between Sz'chwan and the northeastern provinces. This commerce, which is not large, passes through Si-ngan-fu, but is done directly.

FROM SI-NGAN-FU TO CHING-TU-FU.

—o—

THE road which connects with each other the capitals of Shensi and Sz'chwan is among the most celebrated roads in China, because it establishes the only one existing practicable means of intercommunication by land between the northern provinces, and especially Peking, and those of the south-west and Tibet. It may be subdivided into five portions, the distances in which are as follows :*—

1.—In the valley of the Wei River :—		
From Si-ngan-fu to Han-yang-hien	50 *li.*	
„ Han-yang-hien to Hing-ting-hien	50 „	
„ Hing-ting-hien to Wu-kung-hien	90 „	
„ Wu-kung-hien to Fu-fung-hien...	60 „	
„ Fu-fung-hien to Ki-shan-hien	60 „	
„ Ki-shan-hien to Kwei-chin	80 „	
„ Kwei-chin to Pau-ki-hien	60 „	
		450 *li.*
2.—Across the Tsing-ling-shan :—		
From Pau-ki-hien to the Tien-cha-ling pass	75 *li.*	
„ the pass to Fung-hien	145 „	
„ Fung-hien to Liu-pa-ting	177 „	
„ Liu-pa-ting to Ma-tau-chin	90 „	
„ Ma-tau-chin to Pau-ching-hien	95 „	
		582 *li.*
3.—In the valley of Han-chung-fu :—		
From Pau-ching-hien to Mien-hien	90 *li.*	
		90 *li.*
4.—Crossing of the Ta-pa-shan :—		
From Mien-hien to Sin-pu-wan	50 *li.*	
„ Sin-pu-wan to the Wu-ting-kwan pass	90 „	
„ the pass to Ning-kiang-chau	45 „	
„ Ning-kiang-chau to Chau-tien	140 „	
„ Chau-tien to Kwang-yuen-hien...	93 „	
		418 *li.*
5.—In the "Red Basin" of Sz'chwan :—		
From Kwang-yuen-hien to Chau-hwa-hien	50 *li.*	
„ Chau-hwa-hien to Kien-chau	145 „	
„ Kien-chau to Tsz'-tung-hien	165 „	
„ Tsz'-tung-hien to Mien-chau	128 „	
„ Mien-chau to Lo-kiang-hien	90 „	
„ Lo-kiang-hien to Han-chau	100 „	
„ Han-chau to Ching-tu-fu	90 „	
		768 *li.*
Total distance from Si-ngan-fu to Ching-tu-fu		2,308 *li,*
(of 250 to one degree), or 637 statute miles.		

With the exception of that portion which lies in the Wei Basin, and the short passage through the valley of Han-chung-fu, the entire road leads through exceedingly mountainous countries, and its contruction was a difficult undertaking. Before it existed, Sz'chwan was a sealed-up country, inhabited by "barbarians." Han-chung-fu could be reached from Si-ngan-fu by mountain-trails, which followed, probably, the same few lines as those now existing. At an early day, the valley in which it is situated was a dependency of the northern Emperors. The only way by which Sz'chwan could then be reached was down the Han River and up the Yang-tse. But the difficulties and dangers of this water-road did certainly not make it adapted for a

* I have had no occasion to compare these distances, which were given me on the roadside with the official tables published in native itineraries.

conquering army. To get possession of Sz'chwan, it was necessary to build a road from Han-chung-fu to the heart of the province, which is Ching-tu-fu. The way in which this task was accomplished, in the third century before our era, is preserved among the people in a legendary way.* For the northern rulers, who had kept a footing in Han-chung-fu, the existence of that portion of the road was sufficient to keep Sz'chwan in subjugation. But when, in the third century after our era, a descendent of the Han-dynasty, and a sort of Chinese Hercules, by the name of *Liu-pi*, contrived to get supreme power in Sz'chwan, and, assuming the title of "Emperor," took his residence in Ching-tu-fu, he conceived the plan to conquer the North. He took easily possession of Han-chung-fu, and gained a basis of operation. But he needed a good road from there to the Wei Basin, in order to be enabled to throw large bodies of troops rapidly into northern Shensi. It is said, that he put his whole army, 100,000 men strong, at work, and that the great object was rapidly accomplished. Thus the connection between Ching-tu-fu and Si-ngan-fu was completed. It is worthy of note that this road, like probably all great highroads in China, was made exclusively for strategic purposes. No one of them appears to owe its existence to motives connected with the promotion of commercial intercourse. Until this day Liu-pi's road has remained the only practicable one in existence. Marco Polo went over it. Afterwards, it underwent a thorough repair under the Ming-dynasty. Its political importance, and the great traffic which goes constantly over it, make it necessary to the Government to bestow some care on its preservation; but no more work is done on it than is absolutely required to keep it open for traffic. The large interests which it represents should be sufficient inducement for the Government to rebuild it completely.

I will now pass in review the main features of the road, following the partitions used in the table of distances :—

1*st*—After the lengthy description of the Wei Basin, given in the last chapter, little need be said regarding that portion of the road which follows the Wei River. At Han-yang-hien it crosses over to its northern bank. The main wagon-road continues hence in a northerly direction to Ping-liang-fu and Lan-chau-fu, while the Sz'chwan road goes west, keeping at a little distance north of the river. It rises gradually, together with the surface of the loess, and traverses some deep gullies, in which affluents of the Wei River descend. The monotony of the country is relieved by the view of the high Tsing-ling-shan range, which rises beyond the river and culminates in the broad and gently rounded summit of the *Tai-pe-shan*, on which snow lies in summer. Its altitude is probably about 11,000 feet. From Ki-shan-hien a direct road to Pau-ki-hien may be taken, which reduces the total distance to that place to 410 *li*. *Kwei-chin* is, however, worth a visit. It is an exceedingly populous market-town, and the chief place of entrepôt for the trade with Southern Shensi and Sz'chwan. The town is situated on the Wei River, where it flows in the bottom of a deep canal immersed in loess. The sight which presents itself on arriving from the north at the rim of the loess-plateau is surprising. Terraces descend in rapid succession, and at the bottom, 600 feet below the rim, the Wei River meanders in a narrow strip of very fertile alluvial land, and beyond it rises the Tsing-ling-sham. Many villages and towns are scattered in the bottom of the channel, which is probably the busiest and liveliest portion of Shensi.

2*nd*.—*The Tsing-ling-shan*.—At Pau-ki-hien, the Wei River is crossed, and the ascent begins shortly afterwards. From here commence seven days of travel on the wildest mountainroads, because a range of extraordinary character must be crossed. Its northern foot, the summitline, the watershed, the various ranges of which it is composed, the formations of which it is made up—all have the uniform trend of about W. 12° N. to E. 12° S. The direct distance of the northern and the southern foot, at right angles to the line of strike, is 84 miles, the length of the road between the same points 163 miles. The line of highest summits, which nearly coincides with the watershed, is in the north. A short and steep slope, covered in its lower

* It is related that the Emperor Tsin-chi-hwang, desirous of subjugating the great territories of the present Sz'chwan, succeeded in bringing his army across the Tsing-ling-shan range to the valley of Han-chung-fu. From there his troops could easily move to the pass which carries now the name Wu-ting-kwan, but arrived here at a pathless wilderness. He offered relations of amity to the King of the Man-tse who resided at the present Ching-tu-fu, and in token of friendship, well knowing the avaricious character of that prince, offered him two cows which had the remarkable faculty of converting in their stomachs common food into pure gold, having previously taken care that the fame of the wonderful animals should spread and reach the ear of the King. Five delegates were sent to receive the costly present, but on their arrival at the Emperor's Court were given to understand, that the animals, requiring the greatest care, could only walk on well-constructed roads and must cross rivers on bridges. The Man-tse King then constructed the fine road which exists to this day. Tsin-chi-hwang entered the country with his army, and took possession of it. The "Wu-ting-kwan" received its name from the five delegates, in commemoration of the event.

portion with loess, descends from it to the Wei Basin. The waters rush down in cascades through short gullies, cut deep into the rocks, and originating from the confluence of still wilder and more rocky gorges. To the south, long rivers with gradual descent flow towards the Han. Yet the difficulties of road-making were not on the northern slope, but on the southern side, and they increase steadily with the approach to the Han valley; for, the rivers on that side break through gorges and narrows more wild and rocky than those on the north. The mountains do not, as might be expected, gradually decrease in altitude with the increasing distance from the main range, but keep steadily at from 6,000 to 9,000 feet, and then cease precipitously. The further south, the harder are the rocks, the deeper are they eroded by the rivers, the bolder and more ragged is the scenery.

The Tsing-ling-shan is made up of several parallel belts, which are distinguished from each other by the nature of the rocks of which they are composed, and by the character of the surface. A granite belt constitutes the northern descent and the range of highest summits, which have a gently rounded shape. Between them the *Tien-cha-ling* pass is immersed, which is about 3,500 feet high above the Wei River, and 6,000 feet above the level of the sea, and divides the waters of the Yellow River from those flowing towards the Yangtse. The rivulet which the road follows now downward to the city of Fung-hien, for 145 *li*, belongs to the head-waters of the Kia-ling-kiang, which empties as a large stream into the Yangtse, at Chung-king-fu. Gentle depressions are immersed in the granitic belt, south of the summit range and little below the pass; they exhibit the last cover of loess which is encountered in going south, and are well cultivated and inhabited. The second belt consists of a series of very ancient green shists which, from their occurrence on the Wu-tai-shan, I have called the *Wutai shists*. It is over 20 miles wide. The river flows across the strike of the strata, and breaks through them in an angular course, in which some very narrow places occur. Where the road passes these gorges, it winds around the foot of the precipices, and is in several places walled up, or where that could not be done, made of vertical poles fastened in the rocks and covered with planks. The shists are unconformably overlain by strata of Silurian age which are in an almost unmetamorphosed state and distinguished by the occurrence of a bed of coal which is mined in many places. This third belt is composed of several parallel bands, in which thick masses of limestone alternate with more destructible rocks, those constituting rugged crests, while these give origin to gentle depressions between them. The rivers break through the limestone in narrow gorges, some of which leave no room at all for a road. For this reason, the highroad leaves, at the city of Fung-hien, the river which it had followed till there, and, over passes exceeding the Tien cha-ling in altitude, winds up and down, until it reaches the waters of the He-lung-kiang, a mountain-torrent on the side of which it descends to the valley of Han-chung-fu. Where the river is first met by the road, it breaks through the most rugged range of all which make up the Tsing-ling-shan. It constitutes a long and straight line of wild and picturesque summits known as the *Tsz'-pai-shan*. With it begins the fourth belt. It consists of the same Silurian strata which compose the third; but they are here intersected by masses of granite and other eruptive rocks, which have changed the limestone to marble, and hardened and altered the other rocks in various ways. This whole belt is a perfect sea of rugged summits and crests. The He-lung-kiang (or, properly, an affluent of it) descends through it in a deep chasm. The scenery is romantic and very wild. The road keeps close to the torrent and is frequently hewn out in the rocks. In one place the hills recede, so as to form a narrow basin. Here stands, on granite rocks, the fort and city of *Liu-pa-ting*, now almost deserted, but still surrounded with fine and well preserved walls. Finally, the fifth and largest belt is reached. Here the Silurian strata are interwoven with a close network of small granite-veins, and converted into michashiste, gneiss, marble, and quartzite. These rocks continue to Pau-ching-hien. As all of them excel by their hardness, the scenery becomes bold and grand, the mountains have massive forms and tower up to 7,000 and 8,000 feet. The difficulties which the construction of the road had to overcome increase. In the gloomy gorge of the He lung-kiang the trail goes up and down steep rocks, until the river enters a deep crevice enclosed between vertical walls. The road climbs in serpentines to the top of the wall which constitutes the bank on the right hand side. Here stands a gate and temple known as the *Ki-tau-kwan*, which marks the end of the difficulties and perils of the road across the Tsing-ling-shan. A beautiful view presents itself. At the foot of a gentle and grassy slope lies the town of Pau-ching-hien, beyond it the valley at Han-chung-fu, bounded on the other side by the first hills of the Ta-pa-shan.

Among the distinctive features of the Tsing-ling-shan are, its composition of regular and parallel belts, and the absence of longitudinal valleys. There are none of these along the road, and, to judge from Chinese

maps, the entire mountain-range is deficient of them. All the larger rivers descend at right angles to the strike, and only small affluents share in the general direction of the rocks. In consequence, the broad range is a labyrinth of mountains, with very little ground fit for cultivation between them. It is full of game, but in few places only adapted for the habitation of man, and yields almost no produce of value. With the exception of some small coal-mines, which will never supply any region beyond their nearest surroundings, and a few iron-mines, I know of no place in the whole range where minerals or metals are extracted. The rearing of the wild silkworm might be attended with profits, if it were tried; but it has not been introduced.

There are other trails crossing the Tsing-ling-shan, both west and east of this highroad. One of them, which shortens the distance between Si-ngan-fu and Han-chung-fu by four days, is used by coolies carrying freight, but is said to be nearly impassable in winter.

3rd.—Valley of Han-chung fu.—The valley of the upper Han is considered by the people of Northern Shensi as an earthly paradise. The plentiful growth of evergreen shrubs and trees, wild bamboo, orange-trees, palm-trees, mulberry-trees, is sufficient indication of its warm climate. The Tsing-ling-shan, which rises abruptly to summits of 6,000 feet, keeps off the northerly winds, while the Ta-pa-shan, on the south side, commences with gentle and partly well-wooded hills, between which long rivers descend, with here and there some cultivated valley-ground on their banks. Although the Tai-ping's have killed more than one half of the inhabitants, the valley of Han-chung-fu is still very populous, and contains many towns and villages crowded with people. I could not ascertain its extent. At Han-chung the width of the valley appears to be about twenty miles from north to south. But immediately west of the city it contracts to no more than seven miles. It continues nearly thirty miles in that direction, and closes abruptly at the destroyed city of Mien-hien. There, the two enclosing ranges meet, to form to the west a broad mountainous region which is difficult to penetrate. The road goes directly from Pau-ching-hien to Mien-hien, without touching Han-chung-fu.

The valley produces wheat, cotton, tobacco, silk, and many other crops. Besides them, the manufacture of carpenter's *glue* in the district of Si-hiang deserves some notice. There are places in China that monopolize the manufacture of certain articles, which, although not considered of much importance in trade, attain some magnitude when one small region supplies with them the population of many provinces. Of that nature is the manufacture of glue in Si-hiang; probably one half of China is provided from there with that necessary article. On the road from Tai-yuen to Han-chung-fu, it never ceased to be conspicuous among the articles of carrying-trade. The fact that the place, by furnishing a superior article, defies competition, is said to be due to the occurrence of a plant, the bulbs of which are, besides the commonly applied substances, used in boiling the pig-skins which are to be converted into glue. Another industry of the country is the manufacture of *steel*. It is made in several places. The most celebrated among them is Tiè-lu-chwang on the Kiu-sui River, which empties into the Han below Sin-pu-wan. The place is situated 300 *li* up the river, in the Tsz'-pai-shan mountains. Several hundred soldiers are stationed there, on account of the turbulent character of the numerous population at the steel-works.

4th.—The Ta-pa-shan or *Kiu-tiao-shan**—In a west-south-westerly direction from Mien-hien a perfectly straight canal is immersed between the mountains. The Han, descends in it, filling just its bottom. This long river is navigable to the mart of *Sin-pu-wan*, 50 *li* above Mien-hien, and only a few miles distant from its source.†

* On foreign maps, this range has the name "Ta-pa-ling." As it is one of the chief mountainranges in China, I was desirous of tracing the origin of the name. I found that it is not known to the natives, and originated probably in the name of a pass between Pa-chau in Sz'-chwan and Si-hiang-hien in Shensi; Chinese maps designate this pass as "Pa-ling," and one of the prominent summits in the neighbourhood as "Ta-pa-shan." A comprehensive and appropriate name is however generally used by the natives in the adjoining regions. They call those mountains the "Kiu-tiao-shan," that is, "the nine mountainridges," designating therewith the fact that the range is made up of a number of parallel ridges. This name should be retained in preference of the other.

† The distances on the Han-river are given by the skippers as follows:—

From Sin-pu-wan to Tsz'-yang-hien	1,200 *li*.
,, Tsz'-yang-hien to Lao-ho-kou	1,200 ,,
,, Lao-ho-kou to Fan-ching	150 ,,
,, Fan-ching to Hankau	1,240 ,,
Total navigable length of river	3,790 *li*.

I did not ascertain the length of the *li* as applied in this case. But the total distance is probably more than that from Shanghai to I-chang-fu, on the Yang-tsze. In the first 1,200 *li*, rapids are frequent and dangerous, the boats are therefore very small. At Tsz'-yang-hien the goods are transhipped to somewhat larger boats, and a second transhipment to the ordinary boats of the Han-river is made at Lao-ho-kou. Freight from Sin-pu-wan to Lao-ho-kou is 2,000 cash per *tan* of 120 catties. Travellers going east take the water-route; going west, they go usually by land. The road-distance from Lao-ho-kou to Tsz'yang-hien is considered as 720 *li*, and from there to Sin-pu-wan the same.

Goods coming up the river leave here the boats and are carried 125 *li* by land to the mart *Yang-ping-kwan* on the Kia-ling-kiang, whence they descend to Pau-ning-fu and Chung-king-fu in Sz'chwan. The high-road reaches that river lower down, after crossing a complicated defile.

The Ta-pa-shan, in which lies the watershed between the Kia-ling-kiang and the Han-kiang, is a mountainrange of a peculiar character. It is not possible to say where it commences and where it terminates, nor can the limits of its slopes be approximately defined from what we know in regard to it. Its direction is given, on maps, as east-south-east; but its north-western end, that which is crossed by the highroad, is made up of numerous parallel ridges which strike W. 20° S.—E. 20° N. The rocks which compose it are Silurian strata, bent up in several folds, which give origin to the ridges. Limestone-beds, some of which are over a thousand feet thick, alternate with argillite and sand-stone. The rocks are filled with an amazing amount of well-preserved fossils. The region between Ning-kiang-chau and Chau-tien is the richest locality of fossils of any kind or age which I found in China. Some mountains are literally made up of them. The Ta-pa-shan is in altitude much below the Tsing-ling-shan, but it is so deeply eroded, the limestone forms so bold crests, and the rivers break through these in so deep and narrow gorges, that it would be an efficient barrier to intercommunication, if the highroad were not built with care across it, and if the head of navigation of the Han-river were not so close to that of the Kia-ling-kiang. The scenery in the Ta-pa-shan is of great beauty and diversity. Small villages are nestled between the rocks, and some ground is cultivated; but the area of wilderness prevails, and the population is very thin. The Kia-ling-kiang flows through gloomy gorges with perfectly vertical limestone-walls. Where it emerges from these narrows, it intersects a belt of coal-formation, a few miles north of Kwang-yuen-hien, and with this ends the passage through the Ta-pa-shan. The strata follow still the strike of the ridges which compose that range (W. 20° S.), but dip away from it, towards the interior of Sz'-chwan. These coalmeasures form a long but narrow belt and give origin to considerable coal-mining in many places. From the mines near Kwang-yuen the coal is carried down the Kia-ling-kiang.

5th.—Through the Red Basin of Sz'chwan.—Although the boundary of Sz'chwan is crossed in the Tapa mountains, the true character which distinguishes this province commences only at Kwang-yuen-hien. The road from here to Ching-tu-fu is replete with interest. But as it would be impossible to do it justice without going into many details, I refrain from its description at the present occasion. * It is a hilly region throughout, till the plain of Ching-tu-fu is reached. As regards the nature of the country, my observations on the road shall be embodied in the following chapters, together with such information as I was able to gather from the natives in respect to the rest of the province.

* A full and interesting account of the journey between Ching-tu-fu and Han-chung-fu is given by Mr. Alex. Wylie in his "Notes of a Journey from Chingtoo to Hankow." (Proceedings Roy. Geograph. Soc., London. XIV. (1870) p. 168.)

PROVINCE OF SZ'-CHWAN.

1.—*GENERAL CONFIGURATION.*

Sz'-chwan is the largest of the eighteen provinces of China. It comprises a territory of about 167,000 geographical or 220,000 statute square miles, which is nearly one third of the basin of the Yangtse. The western half of this area (about 120,000 square miles) forms part of the great mountain-lands of Central Asia, and, with the exception of some small enclosures, is little populated, almost uncultivated, and of inferior importance as regards the value of its products ; while the eastern portion (about 100,000 square miles) is among the richest and most productive regions in China. This portion only is the proper " Four stream-land " (which is the meaning of the word Sz'-chwan), the western half having been gradually annexed since the time of Kanghi. On another page I will give a few notes regarding these mountainous regions in the west, and confine myself here to the eastern half of the province.

Eastern Sz'-chwan may be described as a large triangular-shaped basin surrounded by mountains, some of which rise above the snow-line, and all of which are difficult to cross. They are made up, in the main, of very ancient formations, mostly of Silurian and Devonian age. The basin is filled with sediments of subsequent origin. Among those of them which take part in the formation of the surface, two only are of practical interest, viz., a coalformation of little thickness, and an accumulation of red clayey sandstones and sandy clays of enormous stratigraphical development. As these rocks predominate largely, and impart their characteristic brick-red colour to the surface where it is exposed, the term of " *the Red Basin* " may not inappropriately be applied to almost the whole area of Eastern Sz'chwan. The summitlines within the basin are nearly at a level with each other, and would, if connected, represent an undulating plane elevated, throughout its greater portion, from 3,000 to 4,000 feet above the level of the sea. But owing to the fact, that the beds of the Yang-tse and its navigable affluents, by which the province is drained, are situated at 1,500 to 2,500 feet below the level of the plane, and that most of the rocks composing the Red Basin are soft and easily destructible, the rivers with all their widespread tributaries, down to the smallest brooks, have eroded deep channels, and converted the entire basin into a thoroughly hilly country. Besides the plain of Ching-tu-fu, Sz'-chwan does not contain more than narrow patches of level ground, and these are scarce and far between.

Neither the configuration nor the geological structure of Eastern Sz'-chwan are, however, quite so simple as might be inferred from this description. Although a basin did certainly exist already during the deposition of the red sandstones, and these are, in extensive areas, in a state of undisturbed stratification, yet the mountainous regions which surround the Red Basin owe their elevation, in part, to subsequent disturbances, which have greatly affected the red sandstones themselves, and have influenced, not only the configuration of the surface, but also the productive power of the province. There are, within the limits of the Red Basin, a number of linear elevations, in which the underlying limestone is bent up from great depth, so as to form, in each case, an axial core, lined on either side by highly inclined strata, among which there is ordinarily noticeable, next to the axis, a double belt of coal-formation, followed on either side by strata of red sandstone standing on edge. In the southeastern portion of the basin these linear elevations range in close succession. The Yangtse breaks through them, and exhibits beautifully their structure. The majority of them have a S W. —N E. trend. The space between every two ranges is occupied by horizontal strata. In these, the bed of the river is deeply immersed, from the place where it emerges from one rocky passage to that where it enters the next. Above Chung-king-fu, there are only a few of these passages, and they are very short. The scenery on the river is there extremely lovely. Below that city, the grander chasms commence, and below Kwei-chau-fu there are wild gorges of great length, well known from all existing descriptions of that portion of the river.

Although my personal observations are necessarily limited, I collected sufficient additional information to enable me to define approximately the limits of the Red Basin. For the purposes of this letter it will answer to describe their general direction. The southeastern boundary is a nearly straight line, starting from *Kwei-chau-fu*, and passing by *Ki-kiang-hien* (south of Chung-king-fu), *Jin-hwai-hien* (south of Lu-chau) to *Yung-ning-hien* (south-east of Sü-chau-fu), thence returning to the Yangtse at *Ping-shan-hien*. To the west, the basin is limited by a line connecting *Ping-shan* with *Ya-chau-fu*, and prolongated from there through *Kwan-hien* to *Lung-ngan-fu*. The north-eastern boundary is much more intricate, and the least known to me. The direct connection of *Lung-ngan-fu* with *Kwei-chau-fu* is, however, a rough approximation to it.

Within this triangle there is life, industry, prosperity, wealth, intercommunication by water. Outside of it, as a rule, no river is navigable, with the exception of the Yangtse where it leaves the basin. To the south and west commence immediately territories occupied by *I-jin* or "barbarians," and in every direction we ascend from the elevated region of the Red Basin into the rugged mountainous countries which surround it. From the basin is derived that large and valuable produce which has justly attracted attention of late years. Outside of it, on all sides, the country is thinly inhabited and little productive.

2.—*MEANS OF INTERCOMMUNICATION.*

The *Yangtse* flows through the Red Basin in the line of its greatest extent. The head of navigation, at Ping-shan-hien,* is situated, at the same time, at the confines of the basin. From there to Chung-king-fu, and as far down as Fu-chau, the river is navigated throughout the year with comparative ease. Below that place, and more particularly below Kwei-chau-fu, navigation is suspended during one or two months in summer. All the affluents on the right bank of the river, below Ping-shan, can be navigated by small boats as far as the limits of the Red Basin extend, which is a short distance in each case. Only on the *Kien-kiang*, which empties at Fu-chau, the Chinese manage to drag their boats over a series of wild rapids to some distance beyond those limits. On the left bank, the Yangtse is joined by three large rivers, the *Min-kiang*, the *To-kiang*, and the *Kia-ling-kiang*. Where they join the Yangtse, are situated, respectively, the great commercial cities of Sü-chau-fu, Lu-chau, and Chung-king-fu. They and their chief tributaries are navigable to the limits of the basin; some of them not quite so far, others a little way beyond. All rivers of Sz'chwan have a strong current, even at low water, and are beset with rapids. Downstream, vessels travel at a quick rate; upstream they are dragged slowly and at great expense. Either way more hands are required than is usually the case in Chinese waters. Transportation by boat is therefore more expensive in Sz'-chwan than in other provinces. The expense of freight increases with the distance from the great rivers. No one artificial canal for navigation exists in the province, the country being totally unfit for their construction, and no embankment (with some local exceptions scarcely worth noticing) is constructed in Sz'-chwan, because none is needed.

Communication by land is difficult everywhere, with the exception of the plain of Ching-tu-fu. The Peking road or *Ta-pè-lu* is the greatest high-road in the country. Another much travelled road connects Ching-tu-fu with Chung-king-fu, by way of Tsz-chau; a third goes from Ching-tu-fu to Tung-chwan-fu and Pau-ning-fu; another to Ya-chau-fu, where the roads to Tibet and Ning-yuen-fu commence. There is also a road connecting Chung-king-fu with Kwei-chau-fu, and proceeding thence to I-chang-fu in Hupè. Valuable merchandize is transported on it, to avoid the dangers of the rapids of the Yangtse. All these highroads, to which should be added a few others, are well paved with flagstones, wide enough for two packtrains to pass each other, and kept in excellent repair. But little care is bestowed upon the grading. At steep places, flights of stairs are made, sometimes of a few hundred steps at a time, with little interruption. The ease with which the ponies of the country climb and descend such places in quickstep is astonishing, and the mules travel on them with a sure pace. But, in general, animals are not much employed in Sz'-chwan. Usually, travellers go in chairs, and the transportation of goods is done by coolies. Away from the high-roads, these are the only modes of traffic. An infinite number of foot-paths permeate the country; and there is probably no hilly region in China so well provided with them. They, too, are paved and constructed with

* Although Ping-shan-hien is, practically, the head of navigation, small boats proceed much higher up the river. But some rapids are so strong that no boat can pass them. Travellers in arriving at such a place must proceed by land for some distance, and take other boats above it.

care. The system of watercourses in Sz'-chwan is so complicated, that no road can be constructed that must not repeatedly cross brooks and rivers. Ferries are in use in those places only where the expense of building a bridge would not be commensurate with the amount of traffic going over it; otherwise a bridge does certainly exist. In regard to the number, and the architectural beauty and perfection of these, Sz'-chwan is undoubtedly a-head of all the other provinces, Kiangsu and Chekiang not excepted It appears indeed, that the possession of a fine and well constructed bridge is a matter of pride for any place that is in need of one. It is another distinguishing feature of Sz'-chwan, that every one of them is in perfect repair; they are built of cutstone, the red sandstone giving an excellent material for monumental architecture. The pillars are either connected by arches, or covered with horizontal slabs of stone, so as to afford a level road. I have seen, on several occasions, blocks 24 feet long, 4 feet wide, and 2 feet thick, employed for that purpose. In the wilderness of western Sz'-chwan it often happens that a road must traverse a narrow chasm between rocks, where deep below the water descends in foaming cascades. Then the chasm is spanned with five or six strong iron chains lying parallel to each other. They are covered transversely with stout planks. Other chains form a sort of railing on both sides. These bridges are frequent in the West. They are perfectly safe, even for pack-animals, provided that these are guided over singly. In other places of a similar character, where a passage for man only is required, wire-bridges of an exceedingly elegant pattern are constructed. In rocky dens filled with huge granite boulders, between which grows a luxurious vegetation, these delicate structures are a surprisingly decorative element.

The cost of transportation by land, in Sz'-chwan, is generally equal to the ordinary price paid where the carriage is done by coolies, namely from $4\frac{1}{2}$ to 6 cash a picul per *li*. On some great roads, where a regular trade is established, the cost is lower. I shall have to mention some notable exceptions on the road to Tibet. In hiring coolies for the distance, the regular price is 250 to 300 cash a day for baggage coolies, and double that amount for chair bearers.

As regards the means of intercommunication between Eastern and Western Sz'-chwan, as well as between both and the neighbouring provinces, I shall have occasion to describe them in subsequent chapters.

3.—*POPULATION.*

Among the inhabitants of the eighteen provinces, the people of Sz'-chwan are (according to my own experience with them) the most gentle and amiable in character, and the most refined in manners. They are also more cleanly and orderly in dress and habits than the Chinese in general. Although somewhat prejudiced against foreigners by stories spread among them, they give evidence by their behaviour, that they are not hasty and superficial in forming an opinion, and desire to improve it by personal acquaintance. Like the people of Shansi, they arrive at the conviction, that men who have attained a high rank in industrial arts must have merit. They meet us with civility and respect, are not in the least shy, and, without evincing that rude curiosity so repulsive to us in many other places, they answer frankly and without hesitation any question put to them. It is no hazard, that the zeal of the early missionaries has left in Sz'-chwan a far more numerous community of catholic christians than in any other province. Wherever I arrived at a place where there lived some of them, they would come and confess frankly their faith before any assembled crowd. I got the impression, that they are true and devoted christians, but that, besides the religion, they have a profound veneration of every thing connected with Europe. Also in regard to the pagan population, I arrived at the conviction that they would like dealings with foreigners, more so than the people of any other provinces, and soon become our devoted friends. Not only in Chung-king-fu, but also in remoter districts, they would be satisfied to see direct commercial intercourse with foreigners established.

The occupations of the poeple of Sz'-chwan are: agriculture, industrial pursuits, small trade, and navigation. They love money, but are deficient in commercial spirit. All the great commerce, throughout the country, in cotton, silk, salt, opium, and white wax, is in the hands of men from Shensi and Kiangsi; and those from Shansi are bankers and pawnbrokers. In the military career, they have never earned a high reputation, nor are many to be found in the lists of the high mandarins. Yet, they appear to range, on an average, with the most intelligent portions of the population of the eighteen provinces, and are not lacking in mental accomplishment. Perhaps their good common sense keeps them from putting too much value on Chinese book-learning.

All those distinctive qualities of the people of Sz'-chwan are surprising, if the manner is considered in which the province has been populated. It appears that, under Tsin-chi-hwang, in the third century before our era, Chinese elements first settled in it. The successful usurper Liu-pi, who reigned at Ching-tu-fu, contributed, nearly 500 years later, to extend the range of country inhabited by the Chinese. He founded Chinese colonies and cities in Kwei-chau and Yünnan. Under Kublai-khan, however, the then existing population was nearly exterminated. In Ching-tu-fu alone, hundreds of thousands are said to have been killed. A general immigration from the adjoining provinces then took place, and Sz'chwan grew, during the reign of the Ming-dynasty, again into a flourishing state. Then only the aboriginal inhabitants were driven back from some portions of the Red Basin, which they had still occupied, and the whole of Eastern Sz'chwan was peopled with Chinese. But on the accession of the Manchu dynasty, a terrible devastation of the province took again place, and the population was nearly exterminated. Again the city of Ching-tu-fu was the greatest sufferer ; it is said to have been destroyed to a great extent. The consequence was, as on the previous occasion, a considerable immigration, chiefly from Shensi and Hupè, but also from Hunan, Kiangnan, Fokien, Kwangtung, Honan, and other provinces. The present population of Sz'chwan has its origin in this mixture of elements, and yet has succeeded to attain an independent and individual character, in which the more favourable qualities of their various parent stocks appear to have been pre-eminently preserved. The inhabitants like their country, and are proud of it. Very few of them are to be found in other provinces.

The number of the population, according to the census of 1812, is given at nearly 22 millions, but is said to have increased to 35 millions. If the first figure was correct, the second is probably no over-estimation, because the people marry very young and have lately not been visited by any great depopulating scourge. It appears, however, that the limit at which the population is well off with its present occupations is near being transgressed. The inhabitants are evidently in a state of general prosperity. In the cities and in the country there is a certain luxury in dress and habitations, in Sz'chwan as compared with other provinces. But although the aggregate wealth may exceed that of most of them, it is only just to add, that it appears to be more evenly distributed, and, therefore, more conspicuous, and that the number of individuals eminent by large accumulated wealth is small. Unfortunately, the same cannot be said of the other extreme. Beggars are numerous, and becoming more frequent every year. This is true, quite independently from their alarming accumulation during the present famine. If the government would take measures to assist people in emigrating to Shensi and Kiangnan, it is probable that Sz'chwan would soon give back to those provinces in numbers of individuals more than it did formerly receive from them.

In no other province of China is there such a sharp distinction between Country and City as is the case in Sz'chwan. Chinese like crowding, the tighter the better. They congregate in cities and villages, but dislike to live alone. The difference of villages and cities is generally more in size than in character, and the smallest hamlet has a tinge of the city. In Sz'chwan, the country is dotted everywhere with farms or small groups of them. There the farmer lives, with his numerous family, in the midst of his fields. Those who are given to industrial pursuits or commerce live in market-towns or cities, but the Chinese type of townlike villages is little represented. The city is thoroughly city, and the country is thoroughly country. People can live in this state of separation and isolation only where they expect peace ; and profound peace is indeed the impression which Sz'chwan prominently conveys.

If the rate at which a people has contrived to develope to its fullest capacity the productive power of the soil on which it lives is taken as a measure by which to estimate its position in the scale of industrial accomplishment, the palm, among all provinces of China, is probably due to Sz'chwan ; nothing speaks more forcibly in favour of the practical intellect of its inhabitants, than the fact that they have succeeded in adapting the products to soil and climate with admirable ingenuity. There are some districts of limited extent in other provinces where this is the case in at least the same measure, but it cannot be said of any other region approaching at all in size the Red Basin.

4.—*PRODUCTS OF SZ'CHWAN.*

While the northern provinces produce not only no noteworthy article for foreign export, but are also deficient in those which, through their diffusion through the rest of China, exert an indirect influence on foreign commerce, we have arrived, in Sz'chwan, at a region abounding in products which are valuable in

both respects. Some of them will in the course of time attain, probably, a prominent position among the articles of export to foreign countries, and there are few provinces of China with which Sz'chwan does not entertain a lively exchange of products.

The Chamber is in possession of so full and valuable information on this subject, through the report of its delegates to the Upper Yangtse, and this document is written with such consummate knowledge of the practical bearings of the questions which are here concerned, that I must fear to appear presumptive if I attempt to add a few words to its contents. Wherever I made enquiries into the kind, or range of distribution, or money-value, of the chief products of the province, I found the statements made there confirmed. I shall have to note a few immaterial exceptions. In some cases it may be of interest to learn the fluctuations of the prices, or a few particulars concerning the mode of distribution of some products, and other subordinate subjects.

Silk.—As regards the quantity of silk produced, Sz'chwan is probably second to no other province ; but in respect to quality, the inhabitants agree that their own product is inferior to that from Chekiang, as regards softness, gloss, and elegant appearance ; its strength and durability allow it, however, to compete successfully with the other at some markets where the silk from both provinces is sold, chiefly in the north. The production of silk is limited to the Red Basin. There are few departments in it that yield no silk at all. But the most prolific regions are in the north and west. In the five departments of Pau-ning-fu, Shun-king-fu, Tung-chwan-fu, Ching-tu-fu, Mien-chau, silk is made in 35 out of 46 *chau* and *hien* districts. To these must be added important districts in Ya-chau-fu, Mei-chau, Kia-ting-fu and Tsz-chau. It will be observed, that this list does not contain the name of any department on the Yangtse. Silk is made in every-one of them, but does not constitute an article of other than local trade. It is difficult to arrive at reliable statements concerning the relative value of the silk from different districts. The most expensive kinds are, very fine white and yellow silks made in the northernmost districts, chiefly Tsz'tung-hien, Kien-chau, (both of Pau-ning-fu), and Mien-chau. The best kinds of Jin-shau-hien (in Tsz'chau) are considered to range with them. With these exceptions, to which must probably be added a few others, all the silks of commerce vary in price within a small range from a certain standard, which fluctuates from year to year, and also in the different seasons. It is said to have doubled in the last ten years. This standard is, the average price of those kinds of the silk of commerce, of which the greatest bulk is exported. The differences in colour, gloss, bleaching, fineness, and evenness give rise to variations of the price above and below the standard, which are specially agreed upon between seller and buyer. In Ching-tu-fu, this standard was, in last spring, Tls. 21.7 per *pa** of 160 Taels; in Chung-king-fu, for the western sorts, Tls. 22.0, which is equal to Tls. 217 and 220 per picul.† Pau-ning-fu sorts are in general coarser and cheaper. Kia-ting-fu is one of the most celebrated localities for white silk, although not for the finest kinds of it. It is at once made up into silk piece-goods, which are sold at Tls. 2.9 to 3.8 per catty of 16 taels. They are much esteemed on account of their superior manufacture and durability, and form a considerable article of trade within the province itself, as well as with Peking and Tibet.

The consumption of silk in the cities of Sz'chwan is extraordinarily large. At New-year's time half the population of Ching-tu-fu was dressed in silk. The exports must reach a very high figure. Much silk goes north, to Shensi, Shansi, Kansu, and Peking. Of the western regions, Tibet is the chief customer. The trade to Yünnan has much diminished, but is still considerable, because that province produces no silk. It

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* Silk is sold, in Sz'chwan, by the *pa*, which weighs 80, 120, 160, or 200 taels, according to the kind of silk and the locality whence it comes ; and by the *pau*, which weighs 50 catties.

† It is very difficult to arrive at the truth regarding the prices of silk, beyond this standard, which is known to everybody. The trade of Sz'chwan, with all its branches, from the purchase of the silk at the places of production, and its collecting at Chung-king-fu, to its disposal at Hankow, Siangtan, Shanghai, and other places of destination, is in the hands of merchants from Kiangsi (and a few from Shensi.) All commerce of Sz'chwan which is managed by Kiangsi men, is distinguished by a code of curious and intricate conventionalities, expressed, as it were, in a language of cyphers. A "catty" of silk and a "catty" of white wax, for instance, may be two different weights ; a "catty" of tobacco from one place of production may be smaller than a "catty" of it from another place, and a "catty" of white wax at the place of production vary from that by which the same article is sold at Chung-king-fu. These conventional weights are quite irrespective of the weights used in general commerce at each separate place. Similar conventionalities exist in regard to the price. A "Tael" of silver may, in speaking of the price of silk from a certain locality mean nine mace, and, in speaking of opium, something more or less. There are other usages concerning certain allowances. It appears that every hong, though conversant with this code of cyphers as far as it regards its own branch of commerce, is not in possession of the generality of them. As regards the trade in silk, each silk hong in Chung-king-fu deals in the product from one or several distinct producing districts, of which it has a kind of monopoly ; and it is not certain whether any separate individual is conversant with all the branches of the silk-trade.

was among the chief articles of trade on the old road from Ching-tu-fu to Ta-li-fu, and found its way from there beyond the Chinese frontiers, to Burma and other countries. Kwei-chau, Kwangsi, Hunan, and Hupè receive much silk from Sz'-chwan. Till of late, little went beyond those limits. But it commences to compete with the silk from Chekiang in the maritime provinces and in the foreign market.* The readiness with which some manufacturers in Sz'-chwan have changed the reel, in order to make the silk adapted for foreign commerce, speaks favourably of their spirit of industrial enterprise.

Opium.—The cultivation of the poppy is very generally diffused throughout Eastern Sz'-chwan. But it has probably attained its highest limit. It is nowhere so conspicuous as between Chung-chau and Fu-chau on the Yangtse, where it occupies probably one third of all cultivated sloping ground. The country thereabouts is mountainous and wild, thinly inhabited, and not fertile. The more favourable the conditions for agriculture, and the more fertile the ground, the smaller is the ratio in which the poppy is planted. Quite unlike the mode of its cultivation in the North, it is rarely seen on level ground, such as the plain of Ching-tu-fu, or the rich bottomland near Kia-ting-fu. The reason is this, that wheat is there more remunerative. In the hills, there are two kinds of fields, those which are made level by artificial terracing, and those which participate in the inclination of the slopes. The first are favourable for wheat, and therefore little used for the poppy. On sloping ground, the crops of wheat are less prolific and more uncertain; it is these fields on which the poppy is chiefly planted, because it is a sure crop and more advantageous than wheat, in a pecuniary way. The profits derived from its cultivation are, however, not large, even on that kind of ground. In the East, the farmer gets a better price for his opium than in the West, and this slight difference in the profits is probably the reason why the poppy is planted much more extensively below than above Chungking. From the extent of my own observations, I estimated, that the poppy does not occupy one-fiftieth part of the arable land of Eastern Sz'-chwan; and the ratio is reduced to less than one-hundredth, if it is considered that it occupies the fields only during one half of the year (from November to May), and to still less if the ground is put down, acre by acre, at its relative value.

The growing of the poppy, considered from an economical point of view, does probably no more harm, in Sz'-chwan and Yünnan, than the planting of tobacco. It has given origin to a valuable article of export, and to a source of revenue derived from ground which would be otherwise of little use. Under the present circumstances, it must be considered as a blessing to the country, that the opium is of inferior quality. In the first place, people who would be otherwise induced to use a strong and high-priced opium, are provided with a weak drug and at a low price. In no other province, with the exception of Hunan, did I find the effects of the use of opium so little perceptible as in Sz'-chwan, among the lower classes, probably because the weakness of the drug diminishes its deleterious effects upon the constitution. Then, if it were of a better quality and paid for as high as the opium from Shensi, the poppy would at once drive from the fields those crops which are essential for the sustenance of the people, and cause immense suffering and, probably, a reduction of the number of the population.†

It is for the same reasons that it is probable, that the cultivation of the poppy has attained its highest limit. Since several years, no impediment has been put upon it, and experience has now fairly shown where the poppy can compete most favourably with other crops. While certain places were found too good for it, it did not thrive at all under certain other conditions. It occupies now probably that portion of the ground which is most adapted for its profitable growth. Besides, the produce of Shensi had much decreased for a number of years, during its occupation by the Mahomedans. That province and Shansi were therefore supplied, to a considerable extent, from Sz'-chwan. Henceforth Shensi will provide its own wants, and supply Shansi. Yünnan may, too, become before long a more dangerous competitor in the production of opium than it is now. On the other hand, however, the government may, at some time or other, remove, or reduce, the very heavy restrictions put on the free circulation of native opium. If then

* While until lately Sz'-chwan silk did not at all appear among the foreign exports, I am informed that 6,000 bales of it left Shanghai in 1871, for foreign countries.

† In explanation of this remark, which may appear to contradict the ordinary laws of political economy, it must be observed, that Sz'-chwan is unfortunately situated, as regards the making up of a deficiency in the quantity of food by importation from abroad. The freight on rice and wheat from Hupè or Hunan to various places in Sz'-chwan would, according to their distance from Chung-king-fu, amount to between one and three times the prime cost of those articles in ordinary years. Besides, from the time a famine is really felt in Sz'-chwan, it would require from three to six months to provide various portions of the province with imported grain, even if a sufficient number of boats were immediately on hand, and the whole required stock of grain lay ready for shipment at Sha-sz' and Chang-te-fu.

Sz'-chwan opium should be able to command at Hankau its present price, the consequence would be, a larger price paid to the grower, and an immediate increase of the area planted with the poppy.*

Around Ching-tu-fu, the hong-price of opium in the cities is, at the time of its collection, Tls. 9 to 10 per 100 taels; it rises in spring to Tls. 12 and 12.5. At Sü-chau-fu, it is nearly the same, but rises to Tls. 13 in spring. Near Fu-chau on the Yangtse, below Chung-king-fu, the opium was being collected when I passed through the country in April. The growers sold it at 180 to 200 cash per tael, or Tls. 10.6 to 11.8 per 100 taels. The hong-price in the cities was Tls. 15 to 16. Much of the opium of that region is shipped to Hankau. The duties between Fu-chau and Hankau are no more than 22 cash per tael.

White-wax (Pe-lă).—This is a valuable and very interesting product of Sz'-chwan. It is largely consumed in the country, and much of it is exported to other provinces. The white wax of commerce is made exclusively in the department of Kia-ting-fu, near the western border of the Red Basin. Sz'-chwan people know that it is also made in Shantung, Chekiang, and Fokien, but speak with contempt of the inferiority of the wax of those provinces. According to my information, none is made in Kwei-chau and Yünnan, or in any of the northern provinces.

The department of Kia-ting-fu is a region where much level ground spreads between gentle hills, and bears therefore an exceptional character in a country so uniformly hilly as Sz'-chwan. Its climate is warmer than that of the plain of Ching-tu-fu, but not so warm as that of the *valley of Ning-yuen-fu*, which is better known as the *region of Kien-chang*, and highly reputed for its beauty of scenery. With admirable sagacity the Chinese have found out, that the breeding of the wax-insect and the production of wax through it are two distinct processes, which cannot be combined profitably in one and the same locality, but, if judiciously separated, may lead to unexpected perfection. The regions of Kien-chang and of Kia-ting-fu divide the labours and the profits. In Kien-chang, near the cities of Ning-yuen-fu and Hwui-li-chau, the insect-tree is planted, an evergreen tree with large and pointed ovate leaves. It is so valuable that it constitutes a separate article of property distinct from the soil on which it grows. On this tree, the wax-insect lives and breeds, but secretes little wax. It is evidently under conditions best fitted for its healthy development. The wax which is made in Kien-chang is just sufficient for the small local consumption and the supply of Yünnan. At the end of April, the Kien-chang people leave their country in great numbers, each with a load of the precious eggs on his back, and travel on a very mountainous road to Kia-ting-fu, which they reach after a fortnight's arduous walking. The road is said to present then during several weeks an exceedingly lively aspect, chiefly at night-time, when they go with lanterns. The heat of the day must be avoided, because the sun would quickly hatch the eggs. These are described as a substance resembling flour, and contained in a bag of the shape and size of a pea. Three hundred of the little bags weigh one tael. They are eagerly bought up in Kia-ting-fu,

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* It is difficult to estimate the amount of opium raised in Sz'-chwan within a year. In a recently published and otherwise very able work it is given as 6,000 piculs, without further commentary. The additional statement is made, that fully one-half of the best arable land of the province is planted with poppy. If 24 taels weight is taken as the product of one mow of ground, 94 square miles would be required to raise 6,000 piculs of opium, and the "best land" of the province would comprise no more than 200 square miles. It is also stated by the same author, that more than one-half of the country people and probably seven tenths of the dwellers in towns are habitual smokers. If 6,000 piculs are divided among one-half of the population as it was in 1812, each smoker would be put on the rather short allowance of less than one taels weight a year.

To arrive at a more probable calculation of the *minimum* of the present production of opium in Sz'-chwan, we may start from the following suppositions: 1st, that the amount of Yünnan-opium imported in a year to Sz'-chwan is equal to the amount of Sz'-chwan-opium exported from the province in the same length of time (the export is in reality much larger than the import); 2nd, that the population of Sz'chwan is 21,000,000 souls, and of these one-half are male individuals; that one-half of the male population are over twenty years of age, and that among these there are fifty percentum, or in all 2,600,000, of smokers; 3rd, that one man smokes, on an average, for twenty copper-cash (Tls. 0.0.125,) daily, or for Tls. 4.5.0 in a year (this is the amount smoked by coolies; the average is much higher); 4th, that the smoker purchases the opium at an average of Tls. 12.5 for 100 taels.—According to these figures, each smoker consumes 2.25 catties a year, and 2,600,000 smokers consume 60,000 piculs. This is the probable minimum. If it is considered that the population is probably larger than here assumed; that the average amount of opium consumed by a smoker in a day is more than 20 cash, in value; that the proportion of smokers is probably considerably above what I have taken for a basis; and that the exports to Siangtan, Hankau, and other places are not by any means counterbalanced by the imports from Yünnan, it will not appear improbable, that the actual amount of opium produced in Sz'-chwan is 100,000 piculs a year, representing a value of about 20 million Taels.

If 24 taels weight of opium are gained from one *mow* planted with poppy (6.66 *mow* = 1 English acre), then an area of 937 square miles is required for raising 60,000 piculs, and 1562 square miles for 100,000 piculs. It is, however, probable, that the average yield per mow is about 30 taels, or nearly two catties, and the area set apart for the poppy therefore not so large.

These figures will appear excessive, if compared with the amount of Indian opium imported every year, and consumed throughout the coast-provinces and extensive regions in the interior. But it must be borne in mind, that an individual who smokes the Sz'-chwan drug consumes more than double in weight of the quantity which is sufficient for the smoker of Indian opium.

and immediately put upon the wax-tree. This tree is said to produce no seeds at Kia-ting-fu, and to be easily multiplied by cuttings. It is not allowed to grow freely, but is kept short, as a stump six or eight feet high. The shoots grow very rapidly. In the following year they serve for harbouring the insect, and as they must then be cut off, other twigs are allowed to grow in the third year. In the fourth, wax is again made, and so on alternately, from year to year. When the egg-balls are procured, they are folded up, six or seven together, in a bag of palm-leaf. These bags are suspended on the twigs of the trees. This is all the human labour required. After a few days the insects commence coming out. They spread as a brownish film over the twigs, but do not touch the leaves. The Chinese describe them as having neither shape, nor head, nor eyes, nor feet. It is known that the insect is a species of *Coccus*. Gradually, while the insect is growing, the surface of the twigs becomes incrustated with a white substance ; this is the wax. No care whatever is required. The insect has no enemy, and is not even touched by ants. In the latter half of August the twigs are cut off and boiled in water, when the wax rises to the surface. It is then melted and poured into deep pans. It cools down to a trans-lucent and highly crystalline substance. Ten taels weight of eggs produce from 2 to 3 catties of wax.

The insect produces no eggs in Kia-ting-fu. The natives believe that the climate is not warm enough. It appears, however, that the plentiful secretion of wax indicates a sort of diseased state, owing perhaps to a too luxurious food. Where the insect breeds, the secretion is much less, and the wax is of an inferior description. The wax trees are planted on fields, either on level ground, or on the lowest portions of the slopes of hills. They are very plentiful in the districts of O-mi, Kia-kiang, Hung-ya and Lŏ-shan, all of Kia-ting-fu. Every attempt to produce good wax in other regions has failed.

The price of white wax at Kia-ting-fu, in the last season, was Tls. 50 per 100 catties of 18.7 taels each,* at Chung-king-fu Tls. 55 per picul. It fluctuates much. A year ago it was Tls. 100, and it has been as high as Tls. 200. The export was, till of late, chiefly directed to Canton and Peking, but descends now, partly, the Yang-tse to Hankau. Great profits are made on it. The amount of production cannot possibly be ascertained. But it appears that, on an average, no less than two millions Taels are divided annually among the growers in Kien-chang and Kia-ting-fu, who earn this money without other troubles than the yearly procession from the former to the latter place, and without devoting to the cultivation any separate ground and any but a nominal expense.

Tobacco.—In few provinces of China does tobacco occupy so conspicuous a place among the articles of produce as in Sz'-chwan, and in no other of them, probably, is its home-comsumption so considerable. This is, because the custom prevails of smoking the leaves rolled up in the shape of cigars, which I did not meet anywhere else in China. Besides, the exportation of tabacco is very large. Sifan and Tibet are entirely provided from Sz'-chwan, Yünnan and Hunan in part, and the exportation to Hankau is, according to the "Upper Yangtse Report," estimated at 50,000 piculs annually.

It is grown in numerous places throughout the province, but the largest production is in the plain of Ching-tu-fu, and in the department of Mei-chau, south of it. The best is from *Pi-hien* (Tls. 12 per picul at Ching-tu-fu.) It is a large round leaf, thin and with fine ribs. This kind is said to grow in no other portion of Sz'-chwan. It is finely cut up and smoked in water-pipes ; a good deal of it is manufactured into snuff. The second quality, in the northwest, is from *Kin-tang-hien* (Tls. 7 per picul) ; it is considered as the best for ordinary smoking. The third is from *Shi-fang-hien* (Tls. 6.5.0 per picul.) All these places are situated in the plain of Ching-tu-fu. The two last-named kinds are so extensively used in the western cities in the form of cigars, that probably no tobacco belonging to them goes to Chung-king-fu. I am not acquainted with the leaf raised in the eastern portion of the province. To judge from the superior flavour and strength of the three kinds of Chingtu tobacco, it appears that, if other modes of preparing the leaf could be introduced, it might be made adapted for the foreign market, more so than the weed from any other portion of China.

Common kinds of tobacco, ranging in price from Tls. 2.5 to Tls. 4 per picul, are raised in many places. *Mei-chau* excels by the quantity of its produce. It yields the bulk for exportation to Tibet.

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* Bees-wax was sold at the same time at 420 cash, or Tls. 0.2.5, per catty, but is said to be at this price much less economical for use than *pelŭ*.

Tea.—In every tea-house I visited in Sz'-chwan, tea "raised in the neighbourhood" was served up. It appears indeed that the tea-shrub is planted throughout the eastern half of the province. Red sandstones, similar in character to those of Sz'-chwan, and approximately corresponding with them in age, are in the eastern tea-growing provinces chosen with preference for planting tea. They prevail through eastern Sz'-chwan, and are indeed everywhere adapted to the growth of the tea-shrub. Only green tea is made, and it is of inferior quality. One locality only has the reputation of furnishing a superior product. It is the Mung-shan hill in Kiung-chau. The tea grown on it is furnished to the Emperor, and prepared for him with water taken from the Yangtse in Ngan-hwei—a beverage praised as a sort of Nectar in native poëtry. Large plantations of tea are scarce. I will mention those of Ya-chau-fu in a chapter on "Western Sz'-chwan", and add some notes regarding the Po-'rh tea when speaking of the products of Yünnan.

It is difficult to see, why eastern Sz'-chwan, being, more than Hupè or Hunan, favoured with that soil which is apparently best adapted for the growth of good tea, should yield an inferior product to that of the neighbouring provinces. It needs perhaps the introduction of other methods of preparing the leaf; but possibly the fact is caused by climatical differences.

Sugar.—Although the cane is planted in many places, the production of sugar from it is singularly limited. Its range comprises several districts on the To-river, besides one to the west of it, and a few in the neighbourhood of the place of its junction with the Yangtse. Two kinds are made:

1*st.*—*Yang-tang* or *Pe-tang.*—Most of it is manufactured in Nui-kiang-hien (of Tsz'chau), the rest in some adjoining regions belonging to Tsz'-chau and Tsz'-yang-hien. The best costs Tls. 5 at Ching-tu-fu, the second quality Tls. 4, the latter costs Tls. 3.4.0 at the place of production.

2*nd.*—*Hung-tang* or *He-tang.*—It is made in the same places, and besides, in Kien-chau (Ching-tu-fu), Kiang-ngan-hien (Lu-chau), Na-ki-hien (Lu-chau) and Yung-hien (Kia-ting-fu). The price at Ching-tu is Tls. 2 to 2.5 per picul.

Until ten years ago the price was less than one-half of what it is now. Since then it has gradually risen. The exportation is chiefly directed to Si-fan, Tibet, Yünnan (white kinds), Han-chung-fu, and Si-ngan-fu, whence it was formerly directed to Kansu, Turkistan, and Ili, as I have described in another page. I copy from the "Upper Yangtze Report," that Sz'-chwan sugar is a considerable article of import to Hankau. It is certainly astonishing to see, how large an area is supplied with this product raised in so small a portion of Sz'-chwan.

Tung-oil.—The general distribution of the *Tung* tree is among the characteristic features of Sz'-chwan. Steep hillsides fit for no other cultivation are planted with it, and it appears to grow best among the wildest rocks. The nuts are gathered in October or November and oil pressed from them. Its price, in last season, was Tls. 3.3.0 per picul. The export amounts, probably, to more than four million Taels.

Salt.—All salt, in Sz'-chwan, is made from brine which is raised in wells. The territory on which they are distributed occupies a large portion of the Red Basin, and chiefly its most central regions. Pau-ning-fu, Tung-chwan-fu, Tsz-chau, and Kia-ting-fu are the departments which yield the largest amount of all salt produced in the province. That of Pau-ning-fu is locally consumed and provides the northeast of the province, together with the upper valley of the Han. Tung-chwan-fu salt is used in the surrounding regions, and goes north to Mien-chau and Lung-ngan-fu. But those places which provide nearly the rest of Sz'-chwan, including the whole West, the province of Kwei-chau, and the country of the Si-fan, are Tsz-liu-tsing, in Tsz'-chau, and Wu-tung-chiau near Kia-ting-fu. The first of these is the most important.

Tsz-liu-tsing is situated about 70 miles east of Kia-ting-fu, and almost aequi-distant from Sü-chau-fu and Lu-chau. The place with its surroundings is said to be the most populous and lively region of Sz'-chwan. As in all great manufacturing places in China, the people have the reputation of being very rude. I did not see the locality, because a visit to it from either the Min River or the Yang-tse can scarcely be performed in less than a week. The salt-wells are distributed on an area of 27 *li* diameter. To make a well, the Chinese use a long and elastic bamboo pole supported in the middle by a cross piece, a rope made by coupling the ends of long (not twisted) slices of bamboo, and an iron instrument which weighs 120 catties. The rope

is fastened on the thin end of the pole, and the iron on the end of the rope. A slight up-and-down motion of the thick end of the pole makes the iron hop and bore a vertical hole with its broad sharpened edge. The ground which is to be perforated consists chiefly of sandstone and clay. Those simple contrivances are therefore quite sufficient to do quick work. When a portion of the rock is mashed, clear water is poured into the hole, a long bamboo tube with a valve in the bottom lowered, and the turbid water raised to the top. For the protection of the sides of the borehole, pipes of cypress-wood are rammed in, and to prevent the water contained in the surrounding ground from getting access to the well, the pipes are attached to each other at the ends, with nails, hemp and tung-oil. The inner width of the pipes is about five inches. As the work proceeds, the pipes are rammed deeper, and a new one attached on the top. The rope, too, is made longer, by coupling to its end another length of bamboo-strips. At a depth varying from 70 to 100 *chang* (equal to 700 to 1,000 feet) the brine is struck, and the well fit for use. The brine is raised to the top with long bamboo tubes and bamboo ropes, as described, by means of a horsewhim, and then carried to large pans for evaporation, or led to them through bamboo pipes.

Besides these wells, there are others which are bored to the depth of from 1,800 to 2,000 feet. At that distance below the surface petroleum is struck. Immediately on reaching it, an inflammatory gas escapes with great violence. Work is now stopped, and a wooden cap fastened over the mouth of the pit, perforated by several rows of round holes. In each of them a bamboo pipe is inserted, and through these the gas is led under the evaporation-pans. The pipes ramify, and on each end a tapering mouthpiece terminating in a small aperture is attached. The gas is thus used for evaporating the brine. The enterprising spirit which induced the Chinese to examine the ground at so great a depth, is said to have had its origin in the drying up of a brine-pit. The proprietor was in hopes of meeting brine at a greater depth, but found in its stead the gas. Ten years ago, when the country was infested with rebels, they removed the cap from one of the gas-pits, and put fire to it. Since that time a long column of fire is said to rise from that pit, and it is considered near to impossible to stop the flame.

The gas-pits and the brine-pits are owned separately by corporations. The owners are subjected to a control from the government, which is however not vigorous enough to prevent a very large defraudation. The management of the government-monopoly is in the hands of a Tautai who resides at the place; but I did not succeed in trying to understand the intricate and yet somewhat loose ways in which the profits are divided. The salt-works of Tsz'-liu-tsing yield, however, a considerable revenue to the government, besides having enriched numerous proprietors, giving occupation to a resident population said to amount to several hundred thousands, and furnishing one of the chief articles of traffic and commerce.

The number of "fire-pits" is twenty-four, the salt-pits are "innumerable." Some of them do not enjoy the advantage of gas; their brine is evaporated with grass and wood.

Wu-tung-chiau is situated a short distance below Kia-ting-fu, on the banks of the Min River. The general depth of most of the pits of that place is 48 *chang* or about 500 feet. Some are said to be deeper, but no one to attain the depth of the brine-pits of Tsz'-liu-tsing; and there are no gas-pits. The brine is less concentrated than at Tsz'-liu-tsing, but the salt is of a similar description.

The localities which I have named are situated in a portion of the Basin which, so far as I am acquainted with the facts, is distinguished by the horizontal position of the red strata. There are, however, other places curiously distributed, where salt-wells were worked in former time, or are still worked at present, and where the brine occurs under very peculiar geological circumstances. They lie chiefly between the great limestone-folds in the south-eastern portion of the province, which I mentioned in another page. Among them is Kwei-chau-fu. When the water of the Yang-tse is at its lowest, pits are made in the river-sand opposite the city, and brine is raised during a few months. A more important locality is situated forty miles N.N.W. of that place, and ten miles north of the Yang-tse. It belongs to *Yun-yang-hien*. The salt-wells are there in a gully, on the northern foot of a limestone-fold. They are only 200 feet deep, but well constructed pits, four feet in diameter. In each of them the brine is raised in four buckets, which are made to ascend and descend with great rapidity; it is then conducted through bamboo pipes to the pans, where it is evaporated.

The salt of commerce is of two kinds :

1*st.*—*Kwo-pa-yen,* or " tabular pan-salt," consisting in solid tabular pieces of crystalline structure, which show still the shape of the pan. This is the best.

2*nd.*—*Ko-tsz'-yen,* or " granular salt." This is the second quality. It is always moist.

A third kind, *Sui-hwa-yen,* must be added. It is full of water, very cheap, and only used in the neighbourhood of the places where it is made.

In regard to the prices I will only mention a few figures which are probably correct :

Wu-tung-yen, that is, *Kwo-pa* from *Wu-tung-chiau,* is sold at the place of production by the manufacturers at 3,000 cash per 100 catties of 20 taels, or Tls. 1.4.0 per picul; at Ching-tu-fu, at Tls. 2.8.0 per picul. This is the average price at the capital ; it varies, according to the whiteness and dryness of the salt, from Tls. 2.5.0 to Tls. 3.0.0. *Ko-tsz-yen* is sold at Wu-tung-chiau at Tls. 1.2.6, but not brought to Ching-tu-fu.

Tsz'-yen, or the salt from Tsz'-liu-tsing, is sold, at the place of production, at nearly the same prices for the two kinds as that from Wu-tung-chiau. It is not used at Ching-tu-fu.

Kien-yen, a rather dark, granular salt *(Ko-tsz'-yen)* from Kien-chau in the department of Ching-tu Its price at the place of production is Tls. 1.3.0 per picul, in the various cities in the plain of Ching-tu-fu, where it is chiefly consumed, Tls. 2.1.2.

Yun-yang Salt is all granular, but tolerably dry. At the factories it sells at Tls. 1.1.0, at Yun-yang-hien at Tls. 1.2.0, above I-chang-fu at Tls. 1.9.0 per picul.

Coal.—If the calculation were accurately made, the area of the coalbearing ground in Sz'-chwan would probably be found to exceed in size the total area of every other province of China. But if that portion only which is available for exploitation is considered, Sz'-chwan compares unfavourably with several of them , chiefly with Shansi and Hunan, and, probably, with Kansu. And if the aggregate thickness of its coal-beds and the quality of the coal are duly put into the calculation, then Sz'-chwan takes still lower rank among the coalbearing provinces.

I have stated in another page, that the ancient formations which constitute the high mountainranges surrounding the Basin of Eastern Sz'-chwan, and make up, without any doubt, its understructure throughout its extent, are covered, first by a coal-bearing formation, and then only by the red sandstones and clayey deposits. Through probably nine-tenths of the area, the coal-measures are buried deep beneath these superincumbent strata, and would, with trifling exceptions, never be available for mining if they were there alike in nature with those portions of them which are worked at present. It appears, however, from reasons too complicated to be here detailed, that boring-tests would prove the fact of a great improvement of the coalseams in depth, as regards not only the quality of the coal but also the number and size of the coal-beds. Still, it is probable, that the best portions are covered by so great thicknesses of red sandstones that they will forever be, practically, out of reach for any means of exploitation, and those only which are intermediate in respect to favourable development form the subject of future mining. The places where the coal-measures are at present exposed to view are distributed in a distinct order throughout the area of the Red Basin. They are situated, firstly, along its limits, where it borders on the surrounding mountains ; in the north, the strata rise towards these, and are visible in remarkably fine sections. Secondly, they flank on both sides every bent-up fold of limestone, within the basin itself, also in those cases where this rock does not rise to the surface. All these belts of coal-formation are narrow but of great length. They are accessible for mining in those places chiefly where they are cut by rivers. The Yang-tse, as it exposes in succession the interior structure of the various folds which it intersects in its course from Sü-chau-fu to Hupè, exhibits the coal-measures in many places, and in all of them some mining is done. The formation extends into the adjoining regions of Kwei-chau, Yünnan, and Kien-chang (Ning-yuen-fu.)

It is difficult to determine the geological age of the coal-formation of Sz'-chwan, nor can it be accurately said where, in the succession of strata, it commences, and where its upper limit is reached. The coal-seams are always few in number, ordinarily one or two, and not far a-part. As regards the quality of the coal, it is in no place good, in some very bad, and in others moderately fair. The best is in the northern and western

portions of the basin, where only bituminous coal occurs. Towards the east and south, it deteriorates, and anthracite makes its appearance at certain levels. The easternmost locality, situated beyond the provincial boundary, in Hupè, is near the city of Kwei-chau. Mining is done there on a few thin seams of very inferior, dirty and friable anthracite. Notwithstanding these unfavourable conditions, the fact of the general distribution of mineral fuel is a great blessing for the country. Mining is easy and cheap, because a horizontal adit. starting in the outcroppings, is generally sufficient to open out for extraction a large portion of a coal-bed, All kinds of coal, not excluding the worst, are used for domestic purposes ; the fuel is within reach of the majority of the people, at low prices, and the necessity of using firewood and, therefore, of planting trees for that special purpose, much restricted. No ground available for agriculture needs to be set apart for raising wood for fuel, which is an incalculable benefit in a country where nearly every portion of the surface can be made use of for cultivating some vegetable product of commercial or industrial value. The existence of the coal has, therefore, the effect to increase not inconsiderably the number of people who are enabled to earn their sustenance on the area of the Red Basin.

The value of the Sz'-chwan coal for foreign interests being at present nil, and its prospective value lying in an uncertain future, I will not tire you, at this occasion, with the long list of localities at which coal occurs in that province ; it would attain some value only if it were accompanied by a geological sketch of the country. Sü-chau-fu, Ya-chau-fu, Ching-tu-fu, and the northern rim of the basin, from Kwan-hien to Kwang-yuen-hien, furnish the largest quantity and the best description of coal, so far as my experience goes. Chung-king-fu is supplied with a large amount of very cheap and very inferior coal. A better kind is brought down the Kia-ling-kiang, and sold at 2 cash a catty. East of Chung-king-fu, the localities where coal is mined are frequent on and near the Yang-tse ; Kwei-chau is the last of them. The anthracite of that place is ground, and mixed with a little earth, then made up into small pyramidal-shaped bricks which are sold at 75 cash a picul. This article, together with some bituminous coal from a place higher up the river, is carried down to I-chang-fu. Beyond that city commences the extensive region which consumes Hunan-coal. It is not probable that these small exports, as they exist at the present time, will ever much increase in quantity. If steamers should succeed in overcoming the difficulties of navigation on the upper Yang-tse, they would find for their own purposes plenty of sufficiently good coal, and at a very cheap price, in the region of Sü-chau-fu, where it is mined in some localities close to the banks of the river and sold at one Tael per ton. Below these, I know of no coal that appears to be adapted for steamer-use, excepting that mined on the Kia-ling-kiang, which can be purchased at Chung-king-fu. Altogether the prices are so low, that even an inferior kind of fuel may be profitably used on steamers. Besides, steam-navigation would give an impetus to coal-mining, and in some places a better article than at present might be obtained by improved methods of working.

Iron.—The manufacture of iron from its ores is among the most generally distributed branches of industry in Sz'-chwan. In this respect, as in so many others, the province differs from the rest of China In no place is iron made on a large scale ; but small foundries are scattered through several departments. The ores occur in the coal-measures ; predominant among them is a gray clay-iron-ore; only in Ya-chau-fu I saw haematite applied. The purest kinds only are used ; they are smelted, with wood alone, in high-furnaces from 20 to 30 feet high. The bellows are worked by hand. In a foundry near Chung-king-fu, I found an excellent clay-iron-ore from Ho-chau applied. Two kinds of cast-iron were made, white hard, and soft grey. The daily production is 4,000 catties. The price is nominally Tls. 46 per 10,000 catties. But two catties of cast-iron are equal to 17.3 taels. This brings the price of one catty to 14.5 cash, or Tls. 13.5 to 14.5 per-ton. Some of the cast-iron is converted into wrought-iron, of which 1,000 catties of 16 taels each are made daily. The price is Tls. 1.8.5 per 100 catties of 16 taels, or Tls. 29 per ton. To make the confusion of prices and weights complete, the iron-ore is sold to the foundry by the catty of 48 taels. Similar prices to these range everywhere in Sz'-chwan. The forgery iron in the shape of small cylinders is an article of considerable local traffic ; its usual price is 30 cash a catty. The iron-industry was probably first introduced from, Hunan, as the process is nearly alike in both provinces.

Other Mineral Products.—As far as I was able to ascertain, no metals whatever, with the exception of iron, are the subject of mining within the Red Basin. In the regions adjoining it to the north-west, north and east, metalliferous deposits or valuable minerals are not known to exist. To the south, however, going into Kwei-chau and Yünnan, we enter, immediately beyond the borders of the Red Basin, upon a very remark

able mineral belt, which shall be more fully mentioned in conjunction with the products of Yünnan and Kwei-chau. It extends into Sz'-chwan, where it comprises the whole department of Ning-yuen-fu, and the district of Tsing-ki-hien in Ya-chau-fu.

Products of Agriculture.—As regards the produce of the fields, Sz'-chwan does not occupy so independent a position as Shensi. Grain is raised in abundance, in ordinary years; but the province produces only a trifling amount of cotton, and this deficiency is not made up by the various kinds of hemp which, the only textile plant raised in large quantity, is in some regions among the staples of agricultural products. Two crops a year is the rule, and in many places three are taken off the ground. Wheat is the staple in winter. It is planted everywhere, and, to judge from the crop of this spring, is of superior quality as regards fullness of ears and size of grain. Barley, peas, fieldbeans, poppy and, chiefly, rapeseed, are simultaneous crops with it. Rice is as general a summer-crop in Sz'chwan as cotton is in Shensi. The province is so well watered, that not only the level ground, but also the bottom of ravines, and many extensive hillsides, can be well irrigated. Other fields are planted, in summer, with beans, soya-beans, groundnut, Indian corn, sesamum, millet, kaoliang, hemp, buckwheat, &c. Tobacco occupies the ground for two and a half months in spring, buckwheat for three months in the same season; hemp is sown in spring and harvested in summer. In the high hills, potatoes are planted, and succeed well; at lesser altitudes their place is taken by the sweet potatoe. The sugarcane is planted in many portions of the Red Basin, and in a few places safflower is a valuable and well-paying crop.

The vegetables of Sz'-chwan are not surpassed by any of China as regards variety and delicacy.

5.—*CLIMATE OF SZ'-CHWAN.*

Sz'-chwan occupies an exceptional position among all the provinces of China as regards the mode of cultivation, and the products, of the soil. I have observed, in another page, that wherever, in China, hillsides do not consist of loess, or are covered with loam, we are accustomed to see little use made of them for agricultural purposes, beyond those limited portions which are terraced and capable of irrigation. In all the provinces south of that portion of the Yang-tse below I-chang-fu, the arable land, outside of the plains and valley bottoms, is therefore remarkably limited. North of it, and more particularly north of the lower Yellow River and the Tsing-ling-shan, the uneven ground is much more extensively cultivated, because loess prevails, but the hills protruding above it are barren. If the same rules did apply to Sz'-chwan, it would be a little productive and poorly inhabited country. After having seen the province of Hunan, which contains much hilly country but also large extents of fertile valleys, and yet lacks so many of the valuable products of Sz'-chwan (such as silk, opium, sugar, white wax, tung-oil), in the place of which it furnishes only tea and coal in better quality than that province, and exceeds it in the quantity of cotton, I expected to find in the famous province of Sz'-chwan extensive bottomland on the rivers, spreading between the hills which were well known to prevail, and the soil endowed with an unusual degree of fertility. Far from finding such a state of things, I had to describe Sz'-chwan as the most uniformly hilly country of China, in fact, with the exception of the plain of Ching-tu-fu, as made up of hills, with a few narrow patches of bottomland between. And these hills are not covered with loam, but—if we leave out of consideration the surrounding mountains, which are nearly unproductive, and confine it to the Red Basin—consist of red sandstone and sandy shale, not in many instances overspread in any great thickness with the products formed by the disintegration of those rocks. As regards the altitude of the country, I have mentioned that the river bottoms are elevated from 1,200 to 2,000 feet and more above the level of the sea, while the general altitude of the hills is from 2,500 to 4,000 feet, and rises to greater elevation in the ridges of the eastern portion of the Red Basin. Where we meet in other provinces with hilly regions similar in character to that of the Red Basin, we find them often clad with a luxurious spontaneous vegetation, but cultivated only in a small extent, unless they are planted with the tea-shrub. And yet, the most notable features of Sz'-chwan consist, not only in the general verdure which overspreads all, leaving only the broken faces of the harder beds of the sandstone exposed, but in the general distribution of agriculture, to which nearly all that verdure is due. It is probable, that in no country of the world, not excepted Japan, an equally perfect use of

the hillsides is made.* As in those beautiful islands, the cultivation of the soil is not limited to agriculture alone, but consists, in great part, in the planting of useful and ornamental trees, such as bamboo, tung-tree, mulberry-tree, cypress, fruit-trees and some kinds of fig-trees, which are very frequent and among the greatest adornments of the country. It is owing to these various circumstances that Sz'-chwan is, considered as a whole, the most beautiful province of China.

It is evident, that the productivity of Sz'-chwan is not due either to the configuration, or to an usual fertility, of the soil. Its chief causes are, probably, the advantages the province derives from its climate and from the ingenuity of its population. I will describe the former as near as I was able to form an opinion in regard to it.

Throughout the Red Basin the climate appears to vary immaterially. The month of September and the first half of October are usually dry. The rice is then harvested. In the latter part of October, and in November, the season is not rainy, but moist. Fogs are frequent. The winter-crops are then put into the soil. Light showers begin in November and continue through December and January, favouring the early growth of the crops. Snow falls on the hills, but disappears quickly, and is seldom seen in the valleys. At Ching-tu-fu, years pass without any snow. The winter of 1871-72 was one of the coldest on record; snow fell three times at the Capital. In February the rains cease, and the dryest time of the year commences. It lasts through March and April. The sky is brighter than at any other season, yet frequently overcast, and in the neighbourhood of the high western mountains, for instance at Ching-tu-fu and at Ping-shan-hien, fogs spread often over the valleys. The temperature rises quick. At the end of March I had 89° F. at noon for several days; the cicada's commenced already their monotonous music. The changes of temperature, however, are very sudden. The winter-crops grow now fast, and in the middle of April the harvest of wheat commences; in the first half of May the crops are nearly off the fields. Water is now turned immediately on those which are destined for rice, and all of them are prepared for the new crops. The rice has meanwhile been sown on overflown fields set apart for the purpose, and is planted in the beginning of June. The season is remarkably well adapted for its growth. In May the rains commence, and swell the rivers sufficiently to provide the fields with the required amount of water; they increase in June, and in July they are most violent; in August they subside. At the end of that month, and in the beginning of September, the rice has time to ripen. Soon afterwerds, the new turn begins with the preparing of the fields. In the plain of Ching-tu-fu, an intermediate crop of short duration is sometimes planted between the rice and the winter-crop.

If the climate of Sz'-chwan, as here described, is compared with that of Hupè, Hunan, Ngan-hwei, Kiang-si, Kiang-su, Che-kiang, Fo-kien, it will be found that the distribution of the rains in the various seasons is almost exactly the reverse. In these provinces, the months of October and November, which are foggy in Sz'-chwan, are the finest and driest of the year. About the end of December rains ordinarily commence; they increase slightly in January and February, are stronger in March and April, and decrease in May. In June and July the dry and bright weather is interrupted by thunderstorms, but rarely by more continuous rains. These recommence in August, and are frequent in September.

Sz'-chwan, however, is but one in a belt of provinces which share in the same distribution of the seasons. To it belong Yünnan and Kwei-chau on the south, and Shensi, Kansu, Shansi, and Chili on the north. Shantung appears to occupy an intermediate position, but to be more related to the northwestern belt than to the southeastern group of provinces. In the northwestern belt, Sz'-chwan occupies the most favoured place. It receives much more rain than the regions situated north of the Tsing-ling-shan, and the climate is milder than that of all the other provinces belonging to the same belt. It has not the excessive heat and cold of those in the north, and is warmer than Yünnan and Kwei-chau, which are much more snowy in winter, and have cooler summers, than Sz'-chwan. Another distinguishing feature of this pro-

* Where the angle of a slope is 30 degrees, the whole hillside is usually covered with fields from the bottom to the top. Where it is 45 degrees and consists of soft rocks only, as is frequently the case on the banks of the Yang-tse below Chung-king-fu, it is devoid of agriculture. But usually the varying hardness of the different strata causes breaks in the continuity of the slope, and then it happens that even at an angle of 60 degrees the slopes are lined with parallel patechs of cultivated ground, in places which sometimes appear quite inaccessible.

The contrast between this mode of cultivation peculiar to Sz'-chwan and that in use in the eastern provinces is very conspicuous in descending the Yang-tse. On emerging from the I-chang gorge, all the sloping ground with an inclination of more than 20 degrees is left completely to itself, and much of that which descends at a lower angle is equally uncultivated.

vince is, the rare occurrence of strong winds. During my stay of three months, I experienced only gentle breezes, and though strong gusts happen occasionally in summer, they are of short duration.

Famine of 1871-72.—The change of the seasons as here described is said to be so regular, and long-continued experience has so perfectly adapted the field-work to it, that any deviation from that regularity is likely to be attended with highly injurious consequences. The last three years have given sad evidence, of the truth of this conclusion, and chiefly the year 1871, which was the most disastrous on record since several decades. Unusually dry weather had not allowed the wheat to grow; then the rains set in so early, that it had no time to ripen, and moulded on the fields. When the rice was planted, the rains ceased. One half of the ricefields were without water, and dried up. People were kept for months to the most rigorous fasting—meat, fish, and even eggs being interdicted by order of the authorities. But this self-sacrifice did not mitigate the supposed wrath of their gods. For, when the rice was being harvested, torrents of rain poured down for about ten days in succession, and flooded the whole country, sweeping the rice off the fields.

I found, therefore, the country people reduced to a state of great poverty and destitution. Rice was, after much suffering, at last imported from Hupè and Hunan; but although large sums went to those provinces in return for it, the quantity was totally inadequate to the requirements. Commerce was prostrate, prices of food extremely high,* and those of luxuries low. Beggars thronged the gates of the large cities, and were frequent along the roads. I passed many a corpse of a person died from starvation on the roadside and left to the ravens and dogs. At Ching-tu-fu, about 20,000 people, most of them in a wretched condition, were fed daily by the authorities, under military guard, and outside the gates, from fear that they might create a serious riot in the city. Emigration had set in, and many families left for Han-chung-fu and other countries. It would indeed be a sad picture were I to draw in full lines the misery which I witnessed in the remoter portions of Sz'-chwan.

Although this state of things is exceptional, and, under normal circumstances, a degree of ease and well-being as regards the sustenance of life, not common in other provinces of China, appears to prevail in Sz'-chwan, calamities similar to the present have occurred repeatedly, and were every time attended with a great amount of suffering, and not unfrequently with deeds of violence. As there is not much room for extending the area of cultivated ground, the evils consequent on a failure of the crops must steadily increase, in every case, with the growing number of the population. I have attempted to show on another occasion (letter on Honan and Shansi p. 22), how much worse the northern provinces are conditioned in an emergency of this kind than those of the south; how the difficulty and expense of transporting supplies through the country, and the slowness with which they spread to all the suffering districts, make bad harvests a source of the greatest misery. Sz'-chwan, with its connection by water with countries which, having a different climate, are likely to be reversely conditioned in each case when the crops of Sz'-chwan are a failure, and with its navigable rivers which make remote districts accessible with comparative ease, would appear to be much more favourably situated than the northern provinces for keeping up a certain balance in the distribution of articles of food between it and the regions adjoining the Lower Yang-tse. But such is not the case. Several months pass before the first grain junk can reach Chung-king-fu, and that is the lowest place from which the various portions of the province must be supplied. Two months more are required for reaching the remoter districts. But the lower regions have so numerous a population, that it would require a larger flotilla than that of all vessels floating on the Upper Yang-tse,† to supply only those with their full requirement. It is, therefore, utterly impossible, with the means now at command, to make up a deficiency of food such as prevails at present in Sz'-chwan.

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* At Ching-tu-fu, rice had gradually risen from the ordinary price of Tls. 3 to Tls. 8 for 280 catties, and was still rising. Wheat flour had gone up from 15 to 20 cash a catty, which is the usual price, to 60 cash. Wages were slightly higher than before, and just sufficient to buy the rice for one man; but almost every man above 18 or 20 years has to support a family. The chief cause of the suffering was, the circumstance that a great number of working-men were thrown out of employ.

† Although it is not possible to estimate correctly the number and average capacity of these vessels, some idea can be formed from the fact, that cotton is the bulk of those articles which are carried up-stream, and that about 300,000 piculs of it (see next foot-note) are annually imported to Chung-king-fu. If this amount is doubled, to 600,000 piculs, we are probably not far below the figure which represents the bulk of the westward-bound trade. That of the goods which go eastward is however much larger, because the boats take double the cargo in going down-stream, and because many vessels built in Sz'-chwan descend to Sha-sz' and Hankau to be sold there. A considerable profit is made on them, and of course they take a cargo in going down.

6.—*GENERAL CONDITION OF THE COMMERCE OF SZ'-CHWAN.*

If the list of the products of Sz'-chwan, as it first became thoroughly known by the "Upper Yang-tse Report," is attentively considered, it shows that the people of that province can, in ordinary years, satisfy, without outward assistance, all their wants as regards articles of food, and are perfectly independent from other countries as regards the supply of tea, the stronger narcotics (tobacco and opium), salt, sugar, coal, iron and other metals, and various commodities, but are not able to supply from the products of their own country their full requirements for clothing. Their chief imports consist, therefore, of cotton and wool, and the cloth made from both. Raw cotton is supplied from Hupè, Hunan, and Shensi, but pre-eminently from the first.* It is distributed throughout the province, and some goes so far as Yünnan and Kienchang. The spinning of cotton, and its weaving into the ordinary Chinese cotton-cloth, occupies many hands, almost exclusively of women, and chiefly in those districts which produce little or no silk. The re-exports to the west and to Yünnan consist to a great extent in the cotton-cloth made in Sz'-chwan. Wool is imported from Shensi and the north-western regions, chiefly Kokonor, Sifan, and eastern Tibet.

The cotton and wool are paid for by the earnings from the sale of the large and varied products of the province; but after having provided for these necessaries of life, the people appear to retain a considerable surplus of their earnings, † which they are able to dispose of for purchasing articles of luxury. These consist in foreign piece-goods‡, chiefly woollen cloth§, furs, and many fancy articles. The general diffusion of a moderate wealth, as we find it in Sz'-chwan, appears to be particularly adapted to secure to such articles a wide and growing range of distribution. The inhabitants have much taste for decent and showy apparel, and for the exhibition of articles of value either on their bodies or in their houses. It is, therefore, to be expected that, in the course of time, they will become excellent customers for the foreign commerce. But as long as the present circumstances last, that can only be the case in good or average years. In case of a famine such as that which prevails at present, the people will not only reduce their earnings by throwing their produce at low prices into the market, but devote the surplus to the purchase of grain, and retain nothing for articles of luxury. Although this is a truism which is applicable everywhere, Sz'-chwan will,

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* The quantity of imported cotton is large. At Chung-king-fu, the average quantity distributed in various directions into the interior of the province was stated to me as 800 piculs a day, or about 300,000 piculs a year, which corresponds exactly with the figure of 200,000 bales of 150 catties each as given in the "Upper Yangtse Report." This amount represents the trade of Chung-king. To it must be added a considerable quantity which passes Chung-king-fu and goes directly to Sü-chau-fu and Kia-ting-fu, and another quantity which enters the province by land, from Shensi.

† Although it is not possible to estimate, with any aspiration to exactness, the aggregate value of the exports of Sz'-chwan, a few figures do exist which may serve as a first basis. In the list of Exports and Re-exports from Hankau, in 1871, as given in the "Returns of Trade" by the Imperial Customs, the following articles are easily recognized as products of Sz'-chwan:

Sz'-chwan silk	piculs	4,075	value Tls.	894,019
Safflower	,,	4,837	,,	294,795
White wax	,,	10,765	,,	647,029
Sz'-chwan rhubarb	,,	2,761	,,	35,616
Musk	,,	14	,,	58,629
Spelter	,,	1,913	,,	7,435
Copper	,,	515	,,	21,658
Wood-oil	,,	290,441	,,	1,825.701
			Total.....Tls.	3,784,882

Among the figures given for "medicine, opium, hemp, tobacco," the produce of Sz'-chwan is represented, but it cannot be seen in what proportion. We arecertainly below the actual amount, if we take Tls. 4,000,000 as the value of those products of Sz'-chwan which descended the Yangtse in 1871 in foreign bottoms. At least the same sum must be adopted for that portion of them, which left Hankau and Sha-sz' in native bottoms and by land-roads, for distribution northward, into Hupè, Honan and Shensi; although some products will be represented in a lesser ratio, the proportion of opium, medicines, tobacco is certainly larger, and to them must be added, sugar and salt, which are not at all in the first list. It is probable, that the sum of four million Taels would not be sufficient to represent the value of the export-trade to Hunan. At least, it is considered at Chung-king-fu, that the exports to Chang-te-fu and Siangtan are larger than those to Hankau. Another portion of the export-trade of Sz'-chwan, that directed, by land roads, to Shensi, Kansu, Shansi and Chili, to the countries of the Sifan and Kokonor, to Tibet, Yünnan, Kwei-chau, and portion of Kwangsi, escapes all attempts at valuation. The grand total of all the export trade of that province is therefore, probably, considerably above Tls. 12,000,000.

‡ Foreign piece-goods, perhaps with the exception of T-Cloth, are considered by the Chinese of all inland countries as an article of luxury. I have heard it invariably stated by the natives, in many provinces, that, as for durability, and cheapness in the long run, foreign cotton goods cannot compete with the native cloth, although their price by the square yard may be lower. It is the greater elegance, the evenness and finish which have made the wearing of foreign cotton-cloth "fashionable." The economical advantage of wearing native cloth is increased when it is home-made, as is the case in many households in Sz'-chwan. It is probable that the refined taste of the people at some treaty-ports who would scorn wearing the coarse garments made of native cloth, will spread in-land; it is the cities of Sz'-chwan where such a change is most likely to occur.

§ In no province is the taste for these so conspicuous as in Sz'-chwan. Broad-cloth is highly appreciated, and much in demand, not for protection against the cold, but on account of its outward appearance, and because it is not within reach of everybody.

on account of its isolated position, be more affected by circumstances of that character than many other countries would be. As regards the present famine, it would, in a country such as, for instance, Ngan-hwei, be a temporary affair, because, however serious the calamity might be, the deficiency would rapidly be made up by the influx of grain from the neighbouring provinces, while, as it befell Sz'-chwan, the serious detriment which must accrue to foreign commerce will probably be felt till some time after the country shall have revived by better harvests.

There are various ways in which an improvement in the commercial relations of Sz'-chwan with the East, and chiefly with the Lower Yang-tse, may be accomplished. The first is, the removal of the artificial hindrances to trade as they exist in barrier duties and taxes of various kinds, a subject so thoroughly treated in the "Upper Yang-tse Report" (p. 4) as to make it superfluous to say anything more in regard to it. It is but just, in relation to this matter, to acknowledge the liberality of the Chinese government in one respect. While the commerce suffers under inland taxation, no check is put upon the productive capacity of the soil. The taxes which the farmer in Sz'-chwan has to pay are merely nominal, and make him almost a free owner of the soil. They allow him to cultivate many an acre of ground which would not yield him profits, and lie waste, were he to pay the same taxes which are established in other provinces. The favoured position which Sz'-chwan enjoys in this respect is an heirloom from the time when, after the devastation of the province perpetrated by the first Manchu Emperors, they desired to offer inducements to settlers, and it is very creditable to the government that the privileges which it then granted have never been withdrawn. Foremost among the stations at which duties on goods are levied at present are : Kwei-chau-fu and Lu-chau on the Yang-tse, and Tsz'-chau, an inland place, situated at the crossing of several important roads.

The second means relates more closely to foreign commerce. It is the encouragement of the productivity of Sz'-chwan. There is room for the extension of the cultivation of several products which do generally not occupy any ground set especially a-part for them. Such are silk and tea. The deficient reeling and cleaning of the silk appear to be the greatest obstacle for its taking a more prominent place among the exports to foreign countries. Labour is so cheap in Sz'-chwan, that the people can afford to use greater care. This is not required for the Chinese market, and so long as that is almost exclusively supplied there is no need for the introduction of improved and more laborious methods. But when it is seen that gain can be made by coming up to the requirements of the foreign market, the people of Sz'-chwan are probably among the first in China to avail themselves of the advantages offered. The change will take time, but there can be little doubt that it will be accomplished. The fact that the mulberry-tree is planted throughout the province, and in places which occupy in no respect an exceptional position, goes far to make it probable that its cultivation can be extended in a very considerable degree. Regular mulberry plantations are seldom met with. The trees are scattered; and it appeared to me that, in every place where one tree stands at present, two or three, or more, might just as well be planted. As regards tea, it is not possible to speak with so much confidence of its prospective value for the foreign market. But if it is considered, that those regions which supply now the demand at the ports have been gained one by one, and have, by slow steps, adopted the proper methods for coming up to the requirements of the foreign taste, and that their range has gradually extended westward, no cogent objection can be raised against the suggestion, that Sz'-chwan may be drawn, too, into the sphere of those regions which prepare the leaf for the foreigners. That tea which is grown at present is decidedly bad, but that is no sufficient argument for disbelieving its capability of improvement if better methods in the mode of preparing it were introduced. I have hinted in the foregoing pages at the possibility that the tobacco raised in the plain of Ching-tu-fu may, if properly prepared, become an article of foreign export. And I will show in another chapter, that the metals of Sz'-chwan and the neighbouring regions have a good chance to figure in their lists at some time or other.

It is probable, that an increase of the wealth of Sz'-chwan by means such as those mentioned will take place, because a country so rich in valuable products as Sz'-chwan cannot escape attracting, in the course of time, that attention which it deserves; and it is probable that that increase would be attended with a growing influx of foreign imports into the country. But such a change would mitigate, and not impede, the fluctuations in the welfare of the people caused by the irregularities in the returns of the crops, and the consequent tides in the amount of funds available for the purchase of foreign goods. Nothing will tend so much to counteract these effects, and to elevate the province to the highest state of prosperity, by

balancing the effects of abundant and deficient crops, than the introduction of the means of a cheap and rapid communication with the regions adjoining it to the east. The question whether it is possible or not to introduce steam-communication on the Upper Yang-tse, can by no means be considered as decided. To a wise and provident government no efforts would be too great to thoroughly ventilate and decide that question, because the well-being of a large, industrious and wealthy population, which may justly be called the flower of China, is so greatly dependent on the introduction of improved means of communication; and the commercial interests at stake are so great, that the foreign community would do well to push the decision of the question. If steamers cannot ascend the Yang-tse, then no other means remains for the thorough opening of Sz'-chwan than a railroad. But unfortunately its difficulties would, in all probability, be enormous. Not only must the high range be crossed which extends as a broad mountain-region between the productive portions of Hupè and Sz-'chwan: but, on arrival in the Red Basin, an incessant defile of hills and deep-cut river-courses must be traversed, where there is scarcely a mile without its difficulties, until the plain of Ching-tu-fu, the most important terminus, is reached. However, our knowledge of the configuration of the surface is so imperfect, that the chances of such an enterprise must not be considered as hopeless, because, with the skilled and cheap labour of China, great difficulties can be overcome which would otherwise be an obstacle on economical grounds. As a railroad following the Yang-tse (which must be completely left out of consideration as utterly unpracticable) figures already ostensibly on a published map, it cannot appear an anachronism to point out, at this early day, the direction where probably the least obstacles will be encountered. Judging from the geological structure of eastern Sz'-chwan, as far as I am able to form an opinion in regard to it, it appears, that the most favourable line will start from the Han-river, at Hing-ngan-fu or Tsz'-yang-hien in Shensi, and cross the Ta-pa-shan in a south-westerly direction, to Shun-king-fu or Pau-ning-fu, and proceed thence through Tung-chwan-fu to the plain of Ching-tu-fu. The direct distance between Tsz'-yang-hien and this plain is only 280 miles. After crossing the Ta-pa-shan, the road would follow what appears to be the easiest and most productive portion of the Red Basin, and be supplied, in several places, with the best coal of Sz'-chwan, at very low prices.

7.—*THE PLAIN OF CHING-TU-FU.*

There are few regions in China that, if equal areas are compared, can rival with the plain of Ching-tu-fu, as regards wealth and prosperity, density of population and productive power, fertility of climate and perfection of natural irrigation, and there is probably no other where, at the present time, refinement and civilization are so generally diffused among the population. I have already stated, that the plain of Ching-tu-fu is the only large expanse of level ground in the province. Its length from south-west to north-east is 90 miles, its greatest width 40 miles, its area about 2,400 square miles. It contains the capital of the province and 18 *chau* and *hien* cities, several of which are superior to many a *fu* city of the other provinces as regards size, population, and stately appearance. Besides them, there are a considerable number of unwalled towns, but only few villages and hamlets. The plain is dotted with small groups of houses, in which the country-people live. Each one of them is nestled under a grove of bamboo, ornamental and fruit trees, which give the country the appearance of being wooded. If sixteen of these groups are taken to be the average on a square mile, and each group to contain 50 inhabitants (both of which figures are probably too low), we arrive at a country population of 800 to a square mile, or a total of 1,920,000 in the whole plain. Adding the population of Ching-tu-fu, which is reputed to be 800,000, and taking for the other cities an average of 50,000, or together 900,000, we arrive at a total of 3,600,000. Some of the cities have certainly less than 50,000 inhabitants, but some (such as Kiung-chau, Han-chau, Shwang-liu-hien) have considerably more. It is probable, that accurate statistics would give a higher figure than that arrived at here on the basis of rough estimates.

The plain has an elevation of, probably, from 1,600 to 1,800 feet above the level of the sea. It is bounded to the north-west by the steep descent of a high mountainous region which, at little distance from it, reaches above the snow-line. On the other sides, the sandstone-hills of the Red Basin rise immediately from the alluvial soil to altitudes of from 1,000 to 1,500 feet above the plain, to continue thence uninterruptedly for great distances. The high mountains protect the valley from the cold northerly winds. On the other hand, it must be ascribed to the cold air descending from them, that, at Ching-tu-fu, the changes of temperature are rapid, fogs of frequent occurrence, and the sky nearly always overcast. The temperature in summer is said to exceed seldom 100 degrees F.

A remarkable and most beneficial feature of the plain is, its natural irrigation. The north-western mountains are interrupted, only in one place, by a narrow gap, on the mouth of which is situated the city of Kwan-hien. Here emerges a powerful river, which has its headwaters in Kokonor. Immediately on reaching the plain, it spreads out into numerous channels. Following the slight inclination of the surface from north-west to south-east, they cross the plain, and converge again on the other side, not into one river, but into two separate and distinct rivers. One of them is the Min-kiang, which passes through the productive districts of Mei-chau and Kia-ting-fu, and reaches the Yangtse at Sü-chau-fu. The other is the To-kiang. It flows through the sugar and salt producing country of Tsz'-chau, and joins the Yangtse at Lu-chau. This river, before leaving the plain, is joined by a number of affluents : short rivers which descend from the front range of the north-western mountains and add to the number of channels of irrigation.

A natural irrigation and drainage is thus effected by more than twenty rivers, which carry the clear water of mountain streams, and are almost equally distributed through the extent of the plain. The channels are moderately wide, generally between 250 and 500 feet (reaching in some instances to 1,000 feet,) and deeply cut between steep banks. All the rivers flow rapidly ; the current of those which came under my observation I estimated at 3 to 5 miles an hour. As they effect a perfect drainage, no embankments are needed. Only a few are navigable a short distance above the lower end of the plain. The industry of the population has made use of these unusual natural advantages, and created a system of irrigation which is probably not excelled in perfection anywhere. Numberless creeks and canals have been dug, and the water is distributed through them and through their branches and branchlets to every piece of ground for which that benefit could possibly be made available. At the places where canals divide or unite, or where the water is made to descend in a cascade to a lower level, the earthworks are protected by walls made of a sort of hydraulic cement. As the ground is subdivided into small fields, and every field has its own level, differing (sometimes only by one or two inches) from that of every other of the surrounding ones, it needed not only an immensely complicated system of irrigation works, but fully as complicated a code of regulations sanctioned by custom and usage, which determine the proportions in which the water of any one canal is distributed into its branches, and the order of succession in which the proprietors of different fields are allowed to make use of it. The system has been so far accomplished, that each rice-field receives, exactly at the right time, its sufficient supply of running water fresh from the mountains. That portion of the water which is no longer needed is easily drained off. The plain of Ching-tu-fu, if compared with other fertile plains of China, has this great advantage, that the swiftness of the current in the rivers and creeks prevents the country from being flooded. I have mentioned, that, in 1871, most of the rice-crop was carried away by water ; but that was in consequence of the immediate effect of the violent and unceasing rains, and not caused by an overflow of the water over the banks of the rivers.

The products of the plain are manifold in kind, abundant in quantity, and superior in quality. Rice and wheat take the first place. Next in order is tobacco, the best of which is grown in Pi-hien, Shi-fang-hien, Sin-tang-hien. Hemp is produced in Wan-kiang-hien and Tsung-king-chau. Silk is raised in a large portion of the plain, chiefly in the southern districts. Kiung-chau produces tea. Poppy is not much planted, because it is less remunerative than grain. Rapeseed, beans, barley, and the many other usual crops of China are, of course, not wanting. Special mention must be made of the variety of delicious vegetables which are raised, and some of which are said to be peculiar to that region. They appeared to me superior to those raised in any other portion of China, and several of them are not known in Europe.

Of manufactures, no one occupies so many hands as those connected with the working of silk into various fabrics. There are large portions of Ching-tu-fu, where in every house spinning, dyeing, weaving, and embroidering are the occupations of the inhabitants. In the country, the reeling, washing, bleeching of the raw material are even in winter a conspicuous business. In the department of Kiung-chau, cotton takes the place of silk. It is imported from Hupè and delivered from the boats at the city of Kiung-chau. The manufacture of cotton-yarn and cotton-goods is there a general occupation, chiefly for the supply of the markets of Tibet and Kien-chang. In other districts, hemp gives a similar employment.

In a commercial respect, the plain of Ching-tu-fu is mainly a dependency of Chung-king-fu, so far as the imports from Sha-sze, Hankau, Siangtan and Chang-te-fu are concerned. Besides, it takes opium, tea and metals from Yünnan ; cotton, wool, furs and skins from Shensi ; some medicines and other produce

from the western mountains; and a great deal of Sz'-chwan produce from various places; such as salt from Kia-ting-fu and Kien-chau; sugar from Tsz'-chau; white wax from Kia-ting-fu; silk from the same department, Mien-chau, and other regions. Of the exports of the plain, little passes through Chung-king-fu. Rice and wheat are sent in large quantities down the river, and distributed through the eastern portions of the province. Tobacco is largely disposed of in all directions of the compass; a small proportion of its total produce reaches Chung-king-fu. A great commerce is done in silk, which is the most conspicuous article in the shops of Ching-tu-fu. That which is made in the plain itself, and in adjoining hilly regions, is brought for sale to Ching-tu-fu and some smaller places, among which the small mart Tsu-chiau, 20 *li* south-west of Ching-tu, is the most important, as it consists mainly of *silk-tien's*. These establishments, of which some very large and elegant ones are in Ching-tu, are a kind of exchange-houses, to which the merchants from the various districts repair, to offer their silk for sale. A great deal of silk is also brought from more distant districts. The principal portion of the business is done for the supply of the very large consumption in the plain of Ching-tu-fu But also the merchants from other places, chiefly those of Chung-king, buy here part of their stocks. Several large hongs in the latter city deal in what they call the "Ching-tu silks." Besides this, there are several other markets supplied with silk from Ching-tu. Considerable quantities are sent by land to Shensi, Shansi, Kansu, and Peking. I shall have occasion, in the next chapter, to speak of the supply of Tibet, Yünnan and other regions to the south-west.

Ching-tu-fu is among the largest cities of China, and of all the finest and most refined. Its walls enclose a square of 9 4-10 *li* each side, but the circuit, including the suburbs, is 48 *li*. On the northern side there is a suburb with a fine street a mile in length. The walls and gates are small, because large ones are not needed. The streets are broad, most of them straight, and cross each other at right angles. They are carefully paved with square flagstones, scarcely one of which can be discovered to be out of place, slightly convex in the middle, and provided with drains on either side. Their appearance is even more picturesque than that of the streets of Canton, because there is more depth to the views. The houses are adorned with fine and carefully elaborated wooden fronts. Within doors is an unusual amount of luxury, cleanliness and ease. Through the gate, the view opens into a series of yards, separated by open halls, every yard a garden, lined on two sides with well-made inner house-frontages. The institution of Clubs is quite general in Chingtu; the houses devoted to them have, when lit up by painted paper-lanterns, a touch of a magic appearance. People are remarkably well dressed, silk being a common material of wear. In the shops all woodwork is polished, and they are kept clean. A large proportion of them are devoted to articles of luxury, such as silk brocades, silk ornaments of all kinds, silk shoes, costly furs, silver-ornaments, articles made up, or set with, precious stones. More than twenty watchmakers find profitable employment; each of them has a shop with watches and clocks. Nowhere in China is art valued by the present generation as high as at Ching-tu-fu. All tea-houses, inns, shops, private dwellings have their walls covered with pictures, many of which remind one of the Japanese ink and watercolour drawings in point of artistic touch. I entered the city during the fortnight of the New Year's festivities. In the evening, every street was a sea of lights, every light put in a paper-lantern adorned with tolerably fair transparent paintings. This artistic taste is perceptible throughout the surrounding country, every smaller city being in that respect like a piece of Chingtu. No traveller can help being struck with the great artistic perfection of the triumphal arches worked in red sandstone which abound in the country. They are covered with sculptures in *haut* and *bas* relief representing scenes of mythical or everyday life, mostly with a tinge of the humorous; some of them are masterpieces of Chinese art. In no respect is the refinement more perceptible than in the polished manners and gentle behaviour of the people, in regard to which the inhabitants of Ching-tu-fu are ahead of the rest of China. Although in foreign dress, I took frequent walks through the city. The people avoided all appearance of taking notice of me, considering any symptoms of curiosity as below their dignity, of course, with the exception of the ever-present little urchins whose education is not yet finished. In the shops I was civilly addressed, and I met with the same civility on the part of the Yamên. The officials said that they made it a point of honour in Sz'-chwan to treat foreigners well, and proved practically that they meant more than polite phrases. Yet, as I had occasion to remark in another page, the people of Sz'-chwan do not like foreigners, partly because they are prejudiced against us by the most curious stories spread among them, and partly because they are on no good terms with the native Christians living among them. But if they would have the opportunity of frequent intercourse with educated foreigners, the probability is, that they would like them better than the Chinese of other provinces do.

I have mentioned these many particulars, because I believe it is not generally known, that so far in the interior of China, in fact just at the limit where the "barbarians" commence, there is a large city superior in almost every respect to those places with which we are acquainted, and inhabited by people devoid of most of those peculiarities which make the Chinese so inattractive to us.

The first cities I passed in the plain of Ching-tu were Tĕ-yang-hien and Han-chau. I was at once much impressed by their superior appearance, and thought they were the finest and most orderly cities I had seen in China till then. The people were just as well dressed and as well behaved as I found them afterwards at Ching-tu. The streets were as clean as those of the capital. Notwithstanding the present famine, it is evident that the people are wealthy on an average and have more wants than the Chinese generally. After leaving Ching-tu, I passed through several cities, and found my impression confirmed. But also the market-towns *(chin)*, of which there is quite a number, have an unusually comfortable appearance. In reviewing the various cities of the plain, I have, however, to draw of one of them an unfavourable picture. This is Kiung-chau, the second in size in the plain, and beautifully situated at the foot of high mountains, on the western edge of the valley. Long before going there, I was warned that the inhabitants of that city and department were in the worst repute of all places in Sz'-chwan, as being coarse and quarrelsome. All men are armed with long knives and use them frequently in their rows. I have passed few cities in China, in which I suffered so much molestation from the people as I did there, and travellers should avoid making night-quarters there, as it was my lot to do. The city is large, and over-crowded with people. They are badly dressed and have repulsive features. The mandarin complained that it was a hard lot to govern them, because there were incessant troubles. This singular population, consisting chiefly of descendants of emigrants from Fokien, is sharply restricted to the limits of the department, and surrounded by people of the general standard of the Sz'chwanese. These bear no ill-will against their rude neighbours, as they ascribe the difference in character to differences of soil and water.

Although there is not such an accumulation of money in any place in the plain of Ching-tu-fu as there exists at Chung-king-fu, still the people at large are visibly better off than in the surroundings of that city. It is in the densely populated plain of the far northwest where exists the greatest aggregate wealth of the province, and, probably, the greatest average prosperity, if the natives are considered individually. Its inhabitants have a taste for articles of luxury, and appear to be accessible to wants in respect to which the Chinese, as a rule, are impervious. They are now second-hand customers for a considerable amount of the staples of foreign import; but if ever more intimate relations between the foreigners and these people should be established, the commercial and social intercourse may become more lively and intimate than it is at several of the open ports.

8.—*WESTERN SZ'-CHWAN.*

That portion of Sz'-chwan situated east of the Min-kiang has always been little known, and only commenced to attract attention since a few years. But that which extends west of the Min is quite unknown, and forms part of the great *terra incognita* of Central Asia, which is enclosed between the two great diverging groups of mountain-ranges, the Himalayan and those which constitute the Kwen-lun. The farther we proceed eastward in the immense triangle enclosed on two sides by those ranges, the more densely, according to Chinese maps, which are our only source of information, is the space between both crowded with mountains. Their structure, their altitude, the order in which they are arranged geographically—all is unknown. Nor is it possible, before we have some slight knowledge of them, to say where they terminate, and which of the Chinese mountain-ranges constitute their eastern extension. A vast region, promising results of greater scientific interest than any other of the unknown regions of the globe, invites here exploration by the geographer and geologist as well as by the naturalist, and promises results of no less importance to the ethnologist and linguist.

I have communicated to you in the introduction to this letter, how my plan to explore at least a portion of the eastern outskirts of that region was frustrated by an adventure which would have been paltry in any other portion of China, but was fatal for my journey on account of the peculiar circumstances of the place where it happened. Nor were my attempts to make up for the loss by collecting information regarding the remoter portions of Western Sz'-chwan and Yünnan crowned with much success, for the reason that

the direct intercourse with them, from the side of Sz'-chwan, extends to certain places only, where it is taken up by other hands. Those places at which most information might be gathered are : Ta-tsien-lu, Hwui-li-chau, and Yung-pè-ting. The first of these is the chief transit place on the road to Tibet. Mr. T. T. Cooper's description of his journey to the frontier of that country, which did not come to my view, will doubtless contain ample information regarding the intercourse with Tibet. His long journey through an extremely interesting region has probably given him an opportunity to extend his explorations far beyond the limits of that road. Another very valuable source of information is to be expected in the publication of the results of the French Me-kong expedition. In view of the extensive contributions to our knowledge which will be given from these sides, it may appear bold on my part, to try to condense into some connected shape the scanty information which I was able to gather.

If a line is drawn from Lung-ngan-fu in the north, by Kwan-hien, to Ya-chau-fu, and from there to Ping-shan-hien on the Yangtse, west of Sü-chau-fu, it marks the western limit of the territory occupied by the Chinese exclusively, and coincides with the boundary of the Red Basin. West of the line, high mountains prevail, many of them reaching up above the line of perpetual snow. They are inhabited, in the main, by people differing from the Chinese in origin and language, and exhibiting their independence by not wearing the cue. Many of the numerous tribes into which they are divided are tributary to China, their chiefs *(tu-sz')* being invested by the Emperor, and considered as a sort of mandarins. Others are quite independent. So far as they inhabit the territory of Sz'-chwan, these aboriginal tribes are classed by the Chinese in four groups : Man-tse, Lolo, Sifan and Tibetans.

Beginning from the north, we first meet with the *Sifan.* They live west of Lung-ngan-fu. The Min-kiang above Kwan-hien is lined with places inhabited by Chinese ; their last station is Sung-pan-ting. But in the mountains on both sides of the river live the Sifan, divided into numerous tribes, each with its own chieftain. They occupy the large department of Sung-pan-ting, also that of Mau-chau, and extend thence far west into Tibetan territory, and into Kokonor.

Their next neighbours south are the *Man-tse,* who are considered by the Chinese as the remnants of the ancient occupants and rulers of the whole province of Sz'-chwan. With the progress of its invasion by the Chinese, they retired more and more to the west. It is said that, at the time of the second Sung-dynasty, they occupied still the departments of Ya-chau-fu, Kia-ting-fu, and Sü-chau-fu, in all of which they left their vestiges in those cave-dwellings dug out of the red sandstone, to which Mr. Alex. Wylie has first drawn attention. They are frequent on the Ya-ho, between Ya-chau-fu and Kia-ting-fu, on the Min-kiang, and Yangtse. At present, the Man-tse inhabit the mountains immediately north and west of Kwan-hien, Kiung-chau, and Ya-chau-fu, and extend thence westward. On the road to Tibet, they occupy the territory till beyond Ta-tsien-lu, near which place is the residence of their supreme chief, a mandarin of the highest order ; the position is hereditary among the descendants of the last independent Man-tse princes. Nearly all the Man-tse tribes are tributary to the Chinese.

The most independent tribe are the *Lolo,* the existence of which is a source of great annoyance to the Chinese. Their territory begins a little distance south of Ya-chau-fu, and extends thence uninterruptedly, across the Tung-ho (the river which descends from Tatsienlu and empties into the Min-kiang at Kia-ting-fu), to Hwui-li-chau, and beyond. On the east, they reach nearly to the line connecting Ya-chau-fu with Ping-shan-hien, and inhabit some mountainous districts on the right bank of the Yang-tse. The valley of Ning-yuen-fu forms part of their western boundary ; but the city of Yuĕ-tsiuen-ting is situated within their territory. The Lolo-country in Sz'-chwan extends through four degrees of latitude. It is mountainous throughout, and a complete bar to all intercourse from east to west. To go, for instance, from Sü-chau-fu to Ning-yuen-fu, a direct distance of 140 miles, requires at least twenty days of arduous travel, because the Lolo-country must be rounded either on its northern or on its southern end. A number of *ting,* or military stations, have been erected in various places along the confines of the region ; but the garrisons which are kept there at great expense are barely sufficient to keep the Lolo at bay, and have never succeeded to make any lasting progress in annexing portions of their territory. A few chiefs in the neighbourhood of those *ting's* have been reduced to the position of *tu-sz'* ; but in general, the Lolo of Sz'-chwan are perhaps the most independent of the various aboriginal tribes which inhabit China proper. While Mantse and Sifan intermarry with Chinese, this is never the case between Lolo and Chinese. They make frequent

inroads upon Chinese territory, and return with the spoils they can get. Their wants are small, and the chief object of their raids is the provision with salt, which they do not possess. The Lolo have been in their present condition since time immemorial, even while the Mantse were masters of the country. It is well known, that several of the independent tribes of Yünnan and Kwei-chau are also called "Lolo"; but I did not learn, on what grounds they are classed under the same appellation.

As to the *Tibetan tribes*, it appears that they inhabit the region adjoining the road to Tibet, west of Ta-tsien-lu, and the whole country west of Kienchang, with the exception of some small enclosures, where Chinese live.

The *Chinese* occupy a very limited aggregate area within the whole territory west of the dividing line of the Red Basin, being confined to a few valleys and to the highroads, along which there are some cities and villages inhabited by them exclusively. Foremost among the territories of which they hold possession is the valley of Ning-yuen-fu.

The Region of Kienchang.—A large area of Western Sz'-chwan is occupied by the department of *Ning-yuen-fu*, which comprises extensive districts inhabited by aboriginal tribes and partly inaccessible to the Chinese. That portion which is held by the latter alone is better known as "the region of Kien-chang." Its capital is the city of Ning-yuen-fu, to which the name Kien-chang is more specially applied; besides it, the cities of Yen-yuen-hien and Hwui-li-chau are most known. Kien-chang is, from all accounts I had of it, a remarkable region. Shut in on all sides by high mountain-ranges, and accessible by two or three long and difficult roads only, this secluded spot appears to be endowed with a singular charm, and its inhabitants to be quite a people of their own. The Chinese even, who have otherwise so little appreciation of beauty of scenery, speak of Kien-chang with a certain enthusiasm, and call it the finest country in China. The people, to judge from my muleteers and the coolies I met on the road, deserve fully their reputation of being an unusually good-natured race. Though most of them are believed to be the descendants of immigrants from Chekiang, the Chinese type is almost obliterated in their features, probably in consequence of intermarriage with aborigines. Ning-yuen is situated at the head of a valley directed from north to south, and varying in width from 10 to 25 miles. It is said to be a large city. The climate is exceedingly warm, and the crops are prolific. Cassia is among the products of the valley. Of the agricultural products nothing goes north, the surplus being disposed of in Yünnan, with which the relations are much closer than with Sz'-chwan. The wealth of Kien-chang consists in its metals, a subject to which I will return when speaking of Yünnan, and in the rearing of the wax-insect, which I have mentioned in the foregoing pages.

Roads.—Western Sz'-chwan is intersected by a few important roads, which are of interest as the only lines of intercourse through a vast and otherwise almost inaccessible territory.—1st, the *road to Tibet*.—Its starting place is Ya-chau-fu, the head of navigation on the Ya-ho, to which boats ascend from the Yang-tse. It passes through Yung-king-hien, Tsing-ki-hien, Ta-tsien-lu, Litang, Batang, Tsiamdo, and, though extremely mountainous, is a great highroad, provided with resting places, and kept in repair for traffic. In winter, the high passes are covered with snow, but still the road is kept open. The most difficult passage commences with the Chinese frontier, beyond Batang, and continues to Tsiamdo.—2nd, *The Road to Western Yünnan*. It starts, like the former, from Ya-chau-fu, and leaves the Tibetan road at Tsing-ki-hien (210 *li*), then continues to Yue-tsiuen-ting (5 stations of about 80 to 90 *li* each), Ning-yuen-fu (5 stations), and by way of Yen-yuen-hien and Yung-pe-ting to Ta-li-fu (about 16 stations). This was an important trade-road before the commencement of the Mahomedan rebellion in Yünnan. Although Ta-li-fu was its proper terminus, the road from there to Yung-chang-fu (6 stations), and Tang-yuĕ-chau (3 stations), may be considered as an extension of it. From the latter place there is only a few days' travel to Bhamo in Burma. It will be observed, that this road establishes the connection, in an almost straight line, between Ching-tu-fu and Bhamo. I was informed that, during the last years before the rebellion, some English goods found their way by it to the capital of Sz'-chwan. In its whole length the road is a bridlepath; and some portions of it are even now much travelled. The Mahomedans in Ta-li-fu are reported to be well provided with English goods from Bhamo. Between Ta-li-fu and Ning-yuen-fu the traffic is at present very small, but it is incessantly kept up between the latter place and Ya-chau-fu. Another important road connects Ning-yuen-fu with Hwui-li-chau (5 stations), and a less frequented one with Li-kiang-fu in Yünnan.—3rd, *From Ta-li-fu to Batang*, by way of Li-kiang-fu. By this old established route the trade between Yünnan and

Tibet is done. It has lately been little used.—4th, From *Tung-chwan-fu* in Yünnan, by *Hwui-li-chau* in Sz'-chwan, *to Ta-li-fu* in Yünnan. This road, which crosses the Kin-sha-kiang twice, will soon be well known by the description of it which is to be expected from the French Mekong-expedition.

Commerce of Western Sz'-chwan.—After having indicated the general conditions of the country and some of the principal directions in which intercourse takes place, a few words remain to be added as to the nature of the commercial relations which exist between the productive regions of the Red Basin on the one hand, and Western Sz'-chwan, together with the regions adjoining it north, west, and south, on the other. I will put the few data which I am able to contribute under the three heads of "Kwan-hien," "Ya-chau-fu," and "Sü-chau-fu," as these are the places from which the commerce starts in various directions. The trade of Sü-chau-fu, which embraces a large portion of that of Yünnan, shall be treated in another page.

1st.—*Kwan-hien.*—This city is situated at the head of the plain of Ching-tu-fu, just at the entrance to the narrow gate through which the Min-kiang emerges in leaving the high mountains. A much travelled rocky path leads to Mau-chau, which is situated higher up the river. An easy road connects Mau-chau with Lung-ngan-fu, and from both places, mountainous and difficult paths lead to Sung-pan-ting, a military station, high up on the Min-kiang. Immediately north of this place are the narrows of Hwang-shing-kwan, where the Jesuits marked the boundary of Kokonor. On the present Chinese maps, it is removed far to the north and west, annexing for Sz'-chwan and Kansu large portions of the old Kokonor or Tsing-hai.

The commerce of Kwan-hien is chiefly directed into the regions of the Sifan, of which it is the key. These people are said to possess excellent mules, better than those usually seen in Sz'-chwan. With them they bring the produce of their mountains to Kwan-hien, and take back what they get in exchange for it. It consists chiefly in sheepwool, deerhorns, shiploads of which can be seen on the Min-kiang, and various kinds of medicines. Foremost among these is *Rhubarb.* The plant grows wild on the highest mountains only. The Bayankara range, which divides the headwaters of the Yellow River from those of the Ya-lung-kiang and Min-kiang, appears to be the central line of its distribution, from which it spreads through the elevated country adjoining it north and south. On the south, it occurs on the mountains in the immediate neighbourhood of Kwan-hien, but the better sorts commence only at a distance of from ten to twelve days journey to the northwest. The chief markets of rhubarb are, Si-ning-fu in Kansu, and Kwan-hien in Sz'-chwan. That which comes from the former place is included in the denomination "Shensi-rhubarb," and commands the highest price, although the Sz'-chwan people are convinced of furnishing a superior drug. The price, at Ching-tu-fu, of the best sorts from Kwan-hien is Tls. 6.3.0 per picul.* The bulbs are not cut, and are of smaller size than these from Shensi, which the Chinese also designate as "horse-hoof rhubarb." In the western portion of the plain of Ching-tu-fu, a sort of rhubarb is cultivated on the fields. Its price is only Tls. 2.0.0 per picul, but it is far inferior to the genuine, which defies all efforts at cultivation, and probably similar in kind to that which is produced near Ta-ning-hien, in the mountains in which the frontiers of Sz'-chwan, Hupè and Shensi meet.

The articles which are exported from Kwan-hien into the Sifan countries are : tea, cotton, cotton-cloth, tobacco, sugar, salt. Chinese merchants are said to live scattered among the Sifan, and to keep the commerce in their hands.

Sung-pan-ting is commercially a dependency of Kwan-hien. The exports and imports are therefore essentially the same. The inhabitants are predominantly Mahomedans. Their commerce is said to extend very far. The merchants undertake expeditions as far as Si-ning-fu in Kansu. It takes an entire season to perform the journey across that grand cluster of intermediate mountain-ranges, and two years to go and return ; the dangers are great, and frequently all the goods are lost.

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* At Chung-king-fu, the price of Kwan-hien rhubarb was Tls. 7.0, of that from Shensi Tls. 12.0. From the "Returns of Trade" for 1871, it appears that the prices at Hankau were, for "Kwan-hien" Tls. 13, and for "Shensi" Tls. 30, while the value at Canton is given at Tls. 50.0. In the last case the place of derivation is not mentioned. The low price of Shensi rhubarb at Chung-king-fu is perhaps due to the low amount of transit dues payable on the land-route, and to the fact, that two kinds of rhubarb are exported from Shensi, one of which is produced in that province and has the reputation of being of an inferior quality, while the other is imported from Si-ning-fu in Kansu, and there appears to be little doubt that that is the best of all.

There is also another, shorter, route from Kwan-hien, by way of Mau-chau and Lung-ngan-fu, into Kansu. It reaches this province at Kiai-chau; but the most difficult passage is from there across a high pass, which bears the often-recurring name of "Fan-sui-ling" ("watershed pass.") It goes thence to the rivers Tau and Wei. No mules can travel on that road. The traffic is done by coolies, but is said to be inconsiderable. The Tsing-ling road is in fact the only one practicable line of communication between Sz'-chwan and Kansu.

2nd.—*Ya-chau-fu.*—I reached this city after five days' travel from Ching-tu-fu. The plain extends till Kiung-chau. From there to Ya-chau-fu the road goes over a low tableland. The city is beautifully situated. West and south extends a semi-circle of high mountains, while to the east the hills are low and have gentle outlines. Several rivers descend from the high mountains and unite to the navigable Ya-ho. It is a large and lively place, because from it starts the trade to distant regions, on the two roads which I have described. The Ya-chau merchants do, however, the carrying only till Ta-tsien-lu and Ning-yuen-fu. The staples of the exports to Ta-tsien-lu are, tea and tobacco, of those to Ning-yuen-fu, cotton and cotton-goods. The *tea* for the Tibetan market is chiefly raised in Kiung-chau, Ming-shan-hien, Ya-ngan-hien, and Yung-king-hien (three districts of Ya-chau-fu.) At these places, the tea for home consumption is worth from 100 to 300 cash a catty, and the poorest people pay no less. But the ordinary quality of the tea for Tibet, which makes up the bulk of the trade, is sold at 15 cash a catty, or a little over a dollar a picul, by the producers. The full-grown leaves are gathered, late in the season, and without any care, and dried at the sun. The growers bring them to the tea-hongs at Ya-chau-fu and Yung-king-hien, where they are made up into long and flat bricks, for the purpose of convenient transportation. These bricks are wrapped in straw; each package, or *pau*, weighs 18 catties. In this state the tea is carried by coolies to Ta-tsien-lu, where the leaves are once more prepared for the Tibetan market. There is probably no road in the world where so heavy loads are carried by man across high mountains as are seen here on the backs of the tea-carriers. Six or seven *pau* is considered a small load; ten or eleven is the average, and, incredible as it may appear, I have seen frequently as much as thirteen (234 catties) carried by one man. I was assured, that some men carry 18 *pau*, or 324 catties. Of no other article they are able to carry so much weight as of tea, the reason being the mode of packing, which allows the load to be very equally distributed along the whole back and, as it were, among all the muscles of the body. The distance from Ya-chau-fu to Ta-tsien-lu is 560 *li*; it is made by the tea-carriers in twenty days; they receive Tls. 1.2.5 for five *pau*, which is equal to 250 cash daily wages for an average carrier. The commerce is very large, and great numbers of coolies are engaged in the traffic.

Other goods for the Tibetan market are: tobacco, cotton-goods, sugar, silk, white-wax; but neither opium nor salt. I saw also a convoy of silver (20,000 Taels) destined for the Chinese troops which are stationed in Tibet.

The most valuable product which Ta-tsien-lu sends in return is, musk. A considerable smuggling trade is done in this portable and valuable article; it must bring easy gain, as single travellers are met who come from so distant places as Canton and Si-ngan-fu, for the only purpose of taking back a small load of it. Although the musk-deer lives through the whole extent of Western Sz'-chwan, and is frequent in the mountains which separate that province from eastern Kansu, the musk-trade of all other places together appears to be insignificant as compared with that of Ta-tsien-lu. Coarse wool, rhubarb, and a great number of other medicinal herbs and roots, are among the rest of the products of the country which Ta-tsien-lu sends eastward. But I was unable to learn of any article of importance passing through the same place on its way from Tibet to China. The tea and tobacco coolies return therefore empty to Ya-chau-fu, with few exceptions.

The *commerce with Kien-chang* is more reciprocal. Cotton and cotton piece-goods, among which there is a considerable proportion of foreign origin, take the most conspicuous place among the exports to that country. Next in order is salt. It occurs largely near Ning-yuen-fu, but is of bad quality, and said to be injurious for the health; the poorer classes of the inhabitants use it on account of its very low price; but whoever can afford it, buys the imported salt from Wu-tung-chiau. Silk is now a small article of the Kien-chang trade, but was in former time the subject of a considerable commerce through Ta-li-fu to Burma. Ya-chau-fu imports copper from Kien-chang, and Kia-ting-fu the eggs of the wax insect.

The present extent of the trade to Western Sz'-chwan, and to regions beyond, including Tibet, the country of the Sifan, and western Yünnan, is not inconsiderable, in the aggregate; but in comparison with the size of those vast territories it is small. All of them, with the exception of Kien-chang, some portions of Tibet, and a few places in Western Yünnan, are thinly populated, and the wants of the great majority of the people are limited to the necessaries of life. And yet, foreign goods occupy already now a relatively more conspicuous place in the trade between Ya-chau-fu and Kien-chang than in many a region situated at much less distance from the treaty ports*; and when the direct intercourse of the foreign merchant with the natives shall have extended into the heart of Sz'-chwan, then those remote regions which are supplied from Kien-chang, Tat-sien-lu and Kwan-hien may be drawn more closely into the sphere of foreign commerce.

9.—*THE MIN-RIVER.*

I crossed the various branches of this large affluent of the Yang-tse first in the plain of Ching-tu. Boats ascend on the easternmost branch to Ching-tu-fu, on the main river a little beyond Siu-tsin-hien, and on a western affluent, which empties into it within the plain, to Kiung-chau. Above those places no navigation whatever takes place. At the mart Kiang-kou, all the branches are united to one single stream which is navigable, at all seasons, by large boats. The highest place where I have seen it is Kia-ting-fu. The Min-kiang is joined there on its right bank by the *Tung-ho*, which, although a larger river than the other, is navigable for about 200 *li* only. It descends from the Sifan country as a wild mountain torrent, passes not far from Ta-tsien-lu, and breaks through the great Omi-range in inaccessible gorges, dividing the independent tribes of the Lolo, on the south, from the tributary Lolo on the north. Shortly before its junction with the Min-kiang, it receives from the west the *Ya-ho*, which I descended from Ya-chau-fu to Kia-ting-fu. It is full of rapids, and considered very dangerous to navigate. Goods are mostly transported on bamboo rafts. The distance is 270 *li*, and easily made in one day in going down, but to go up-stream, four or five days are required. Freight either way is 500 cash, or Tls. 0.3.0 per picul. Cotton, cotton-goods, porcelain, tobacco, sugar, salt, silk—are the principal articles going up-stream; on the down-trip the boats carry iron pans and wrought iron from Yung-ping-hien, spelter and lead from Tsing-ki-hien, copper and coffin-boards from Kien-chang, potass made from herbs in the hills west of Ya-chau-fu, rhubarb and a variety of other medicines from Ta-tsien-lu. The country is one of the most lovely and fertile spots in Sz'-chwan. White wax and silk are its most valuable products. Kia-ting-fu is the centre of the trade in both. A-part of this and its beautiful situation, the city offers nothing worthy of note; it owes its reputation chiefly to the costly products of the surrounding country.

Below Kia-ting-fu, the Min-kiang is a fine stream. With the exception of a dangerous rapid above Kien-wei-hien,† it offers no serious obstacle to navigation. The current is swift but regular. Vessels taking as much as 1,600 piculs freight navigate the river and, at high water, ascend the small branch leading to Ching-tu-fu. The voyage with them, up-stream, is slow and expensive, owing to the swiftness of the current.—At Sü-chau-fu the Yang-tse is reached. It is a tolerably large city, and has a busy appearance, owing to the trade with Yünnan.

10.—*SÜ-CHAU-FU.—NOTES ON YÜNNAN.*

For all practical purposes, the Chinese view can be adopted, which considers the Min-kiang and Yang-tse as one stream, fed at Sü-chau-fu by a large but unimportant affluent (the Kin-sha-kiang), which is navigable for a short distance only, and serves in its upper course little or no purposes of traffic. For the navigation on the Great River, Sü-chau-fu is therefore only an occasional station on the way, which would have no further importance if it were not the Key to Yünnan. Here is the starting-place

* This fact which may appear startling at first sight can be explained in a natural way. If in eastern Sz'-chwan, for instance at Chung-king-fu, a certain kind of foreign cotton-cloth is cheaper by the square yard than the native, but the latter more profitable to use on account of its better wear, the proportion between the money-value of the two will change with the distance from that place. For, if equal amounts of freight are paid for equal weights of both, the difference in price per square yard between the native and foreign fabrics will increase, and at a certain distance, a limit will be reached where the imported cloth is just as economical for use as the native, and beyond that it may be even more profitable than this. Such may be the case at Kienchang, and therefore the demand for the foreign cloth be proportionately greater than at Chung-king-fu. This consideration is irrespective of any difference that may exist in the transit dues that are to be paid on one and the other of the two kinds of fabrics.

† This is considered the most dangerous rapid between I-chang and Ching-tu-fu. In November and December the danger is greatest; hardly a day is said to pass then without the occurrence of a wreck.

for the imports to that province, and the chief outlet for the exports from it. Some goods take other routes; but as far as the intercourse with China is concerned, Sü-chau-fu has taken the lead.

My project of a journey through the whole extent of Yünnan having been blighted, I must apologize for offering you a very meager account of the trade and products of that country, in the place of the full information regarding these and many other subjects which I was in hope I would be enabled to furnish. I have attempted to collect some date at Sü-chau-fu. But, as intermediate stations exist on the trade-roads, which are usually the farthest places reached by those engaged there in the trade, it is difficult to get the desired information accurately. I must remark here at once, that if Yünnan is spoken of as a commercial district, at Sü-chau-fu, the provincial boundaries are not strictly adhered to. A glance at the map shows, that a narrow strip of country, with the cities Ta-kwan-ting, Chau-tung-fu and Tung-chwan-fu, belonging politically to Yünnan, extends northward, between the department of Ning-yuen-fu (Sz'-chwan) on the west and the province of Kwei-chau on the east, and reaches to within a day's journey from Sü-chau-fu. All that passes through those cities constitutes what is called the commerce of Yünnan. Thus it happens, that *Hwui-li-chau* and other districts of Ning-yuen-fu, as well as some portions of Kwei-chau, in particular the district of *Wei-ning-chau* (in Ta-ting-fu,) are comprehended in that elastic term. In all what appertains to commerce and products, I will adhere to this well-founded and natural mode of division.

Present State of Yünnan.—The Mahomedan insurrection broke out in 1855. You are acquainted with its early history. It has been a drawing game ever since. The war consists not in battles, and scarcely in any fighting, but in the attempt of either party to gain small advantages over the other. The soldiers will cut off a body of rebels, and, if fortunate, contrive to besiege them, and, perhaps, finally, to take the place to which they have withdrawn. On neither side much valour appears to be displayed; the Chinese troops are decidedly deficient in active courage, and if the Mahomedans did possess it, they would make better progress. As regards strategic skill, the Chinese appear to have gained lately a few advantages. The Mahomedans occupy some cities in the west and south, with Ta-li-fu as their main stronghold. But around this place, and generally throughout the north and east, are the Imperial troops: strange to say, they are commanded by a Mahomedan, General Ma, who is believed to be true to the cause of the Chinese Emperor. The Governor of the province lives at Yünnan-fu. The rebellion did never spread north of the Yang-tse into the territory of Sz'-chwan; and in Kwei-chau, only the depart- of Hing-i-fu has been drawn into it. It is situated on the boundaries of Kwangsi and Yünnan. From there, through western Kwangsi, to Ling-ngan-fu, Po-'rh-fu, and the north-western portion of Tongking, the whole country is in a state of anarchy. Although Imperial civil mandarins occupy their posts in some of the cities, they are completely powerless. The people, who are partly Chinese and partly aborigines, are guided by petty chiefs, some of whom are Imperialist, some Mahomedan, and some independent. Deeds of violence are said to be of no rare occurrence; but apart from these little feuds, no active enmity appears to exist between the different elements. The Mahomedans of Yünnan exhibit much more good sense than those of Shensi and Kansu. They desire to rule the country, but do not destroy villages and cities, nor do they indulge in wholesale massacres of the population. They allow the inhabitants to carry on their agricultural occupations, and encourage trade, only diverting taxation from its previous channels into their own treasury. The Mahomedan Government restitutes to Chinese merchants the property stolen to them by its own subjects, and the malfactors, if caught, are beheaded. Still there is, also in those regions where the rebels exert supreme power, a state of anarchy and insecurity, and the presence of many Imperial soldiers is rather an additional cause of misery than of relief, in those departments still held by the Chinese. The numerous mountain tribes which, under many different names, are scattered through all portions of the province, have made use of the disturbed state of affairs, and regained to some extent their independence. They do not perpetrate acts of open hostility, but have put themselves in possession of the mines, most of which are situated within their territories. The production of metals has therewith nearly ceased.

These political troubles have, of course, very materially affected the trade and commerce of Yünnan, which are reduced to a mere fraction of what they were before 1865. They have never been great; and the marked attention which they have received must chiefly be ascribed, to the peculiar interest attaching to the eccentric position of Yünnan; to the existence of trade-roads, which pass through it and connect distant countries with each other; and to the circumstance that metals (among them gold) and

precious stones, both of which are to the common mind the most patent proofs of the existence of boundless wealth, have been from of old the most known products of Yünnan. As regards agriculture, the productive power of the province is considered inferior to that of Eastern Sz'-chwan, if equal areas are compared, and from the nature of the country it cannot be expected to be great on an average, although it is quite evident, that the province contains some naturally very favoured regions.

Little is known as regards the configuration of the surface in Yünnan. So far as I was able to draw inferences from scanty descriptions, it appears, that the central portion is occupied by an extensive plateau, ramifying in various directions; that this contains extensive valley-plains, at altitudes of from 5,000 to 6,000 feet, some of which are occupied, in part, by large lakes; that in them are situated most of the principal cities, for instance, Tung-chwan-fu, Yünnan-fu, Mung-hwa-ting, Ta-li-fu, Yung-chang-fu, Tsu-hiung-fu, Ling-ngau-fu; that the plains are overtopped by ridges which separate them, and, similar to those of Shansi, rise to a nearly uniform level, so as to exhibit, when seen from the plains, apparently connected, horizontal summitlines; also that these ridges and the whole plateau are built up of red sandstones and shales resembling in every respect those of the Red Basin of Sz'-chwan, and occupying a little disturbed position. Rivers small and large have furrowed their beds from hundreds to thousands of feet deep in these easily destructible rocks, and exposed the older ones on which they rest, rendering intercommunication in certain directions extremely difficult. It appears that on all sides, excepting to the east and northwest, a descent through the most ragged labyrinth of deeply eroded mountains commences from the outskirts of the plateau, where the red sandstones cease abruptly. To complete this sketch, some very elevated mountain-ranges must be mentioned, the snow-covered summits of which tower up high above the plateau. They are chiefly situated in the northwest.

The climate of Yünnan is known to be cooler than that of Sz'-chwan. In the summer months, the air on the plateau is said to be delightful, but unhealthy; in winter, the snow lies deep at Yünnan-fu, and covers the ground for weeks at a time. The valleys on the plateau are well fitted for agriculture, and the province is independent of its surroundings as regards food. But cotton is not planted, and the province lacks some of the valuable products of Sz'-chwan, as silk and white-wax.

Mineral Products.—The dormant wealth of Yünnan is founded in its mineral produce, in regard to the variety of which it is the first country of China.

Coal occurs in many places which are, it appears, distributed on the borders of the plateau. I learnt particulars in regard to those places only which are the first on the highroad from Sü-chau-fu to Yünnan-fu. The most noteworthy facts were related in regard to Chau-tung-fu, where anthracite ("no-smoke-coal") of superior quality is said to be mined in blocks so large that they must be carried by two men, and spaces "as big as the largest houses" are worked out underground. It would appear from this description, that a very thick coal-bed with very solid coal occurs in that place. At Tung-chwan-fu and Kiu-tsing-fu, an impure coal is mined. These are the last places of its occurrence, in a southerly direction.

Salt appears to be, comparatively, as largely represented in Yünnan as it is in Sz'-chwan. But I know nothing in regard to its mode of occurrence.*

Metalliferous Region of South-western China.—Turning now to the occurrence of metals, we are here in an extremely remarkable region, which is highly worthy a detailed examination, because a great variety and quantity of metalliferous deposits are distributed throughout its extent. The country so distinguished comprehends nearly the whole of Yünnan, from Ta-kwan-ting in the north to Po-'rh-fu in the south, and from the eastern boundary of the province to Tang-yuĕ-chau in the west. Besides, it extends across the Yang-tse, and comprises the whole department of Ning-yuen-fu, till Tsing-ki-hien, a district of Ya-chau-fu; and in the east, the district of Wei-ning-chau (department of Ta-ting-fu) in Kwei-chau. There are no positive indications to show,

* Since writing the above, Mons. Dupuy has kindly furnished me the following data: No deep brine-wells with small aperture, like those of Sz'-chwan, occur in Yünnan. In most localities there are pits of larger size, similar to those of Yun-yang, and not very deep. Mons. Dupuy heard of several places, where the brine is got by driving a tunnel into a hillside.

that the metalliferous region extends beyond those limits to the south, west, and north, but this is different as regards the direction to the east, or rather, northeast. I have had several statements given to me concerning the occurrence of ores of copper and silver through a large portion of Kwei-chau; but as no mines are worked outside of Wei-ning-chau, the statement cannot be considered as proved, nor would it be of importance at present. It is, however, a very remarkable fact, that, immediately adjoining the metalliferous region of Yünnan to the north-east, commences a belt distinguished by the occurrence of quicksilver and its ores. It extends through the whole width of the province of Kwei-chau. Quicksilver is found only in this belt, and not in Yünnan. I will now give briefly an account of the gleanings I was able to get in regard to the various metals which are exported from Yünnan to Sü-chau-fu.

Copper is the most conspicuous among these, and of the various trades at Sü-chau-fu that of the coppersmith is particularly well represented. Though arriving in a tolerably pure state, the copper is once more refined, and some of it worked up at once into sheets, wire, vessels, and various other articles of use. A portion of that which remains for re-export is made up into the shape of extremely coarse vessels, to avoid the duty which otherwise would have to be paid on the metal in going down the river in a crude state. Formerly it was the subject of a large trade. The copper-ore is so generally distributed throughout the whole metalliferous region, its deposits are said to be so easily accessible from the deep gorges in which the rivers flow, and the ore—to judge from the few specimens which I have seen*—is so pure, that mines could be worked in a great number of places when the political state of the country was not yet troubled. Yünnan Proper was then the chief source of supply. At present, the copper comes almost exclusively from Hwui-li-chau, in the department of Ning-yuen-fu. A considerable number of small mines are worked there in the hills north of the city. They are owned by private companies, on terms of a license which obliges them to sell the metal, at the fixed price of Tls. 8 per picul ($160 per ton), to certain holders of a government concession who reside at the mine and have a small military force at their command. These have to remit Tls. 2 per picul into the provincial treasury, and sell then the copper at the best price they can get for it. They are properly an association, consisting chiefly of merchants, but have usually one or several high mandarins (provincial governor, commander of military forces, &c.) as free partners, and the business is controlled by a buttoned commissioner. The expenses and risks rest with the merchant-partners. Some duties are paid on the copper on the road to Sü-chau-fu, and here the copper is sold at Tls. 20 per picul, or about $400 per ton of 2,000 pounds. The whole trade appears to be at present no more than from 500 to 600 tons a year. Hwui-li-chau is not the only place which contributes to it. Yen-yuen-hien and Si-chang-hien, both of Ning-yuen-fu, furnish too their share. The northernmost mines are in Mien-ning-hien (Ning-yuen-fu); the copper produced from them, together with some from the other places, belongs to the government and has its outlet at Ya-chau-fu.

White Copper (Pe-tung.)—This alloy has a conspicuous place in Chinese commerce. It is produced directly from the ores, in which the various composing metals appear to be always present in little varying proportions. Although generally believed to be derived from various places of Yünnan, Kwei-chau and other provinces, those engaged in the trade at Sü-chau-fu assert positively, that the only place where it is produced is Hwui-li-chau in Sz'-chwan. It is sold there at Tls. 40 per *tan* of 160 catties, or $500 per ton; at Sü-chau-fu, at Tls. 40 per *tan* of 100 catties, or $800 per ton. The Copper-smiths get it in the shape of round cakes of about seven inches diameter, but remelt much of it at once and alloy it with copper, zinc, tin, and lead, in certain proportions, so as to suit different purposes. To this circumstance is due the difference in the composition of pè-tung, which has been discovered by chemical analysis. Copper, nickel, and zinc were usually found as the chief constituents; most kinds contain also small quantities of lead, tin and iron. The alloy is used for an infinity of small articles, as water-pipes, tea-pots, plates, candle-sticks, incense-basins, and others.

Silver.—The supply of this metal is at present very small, and appears to have been at no time large. Most of it came formerly from Yünnan; but since that source has failed, the supply is limited to Wei-ning-chau in Kwei-chau. The ore of that place was described to me as "very rich, of black colour,

* The ores which I have seen are: copperpyrites of great purity, peacock-ore, and native copper. The last is said to be in some places the principal ore in use; it is found in small and large pieces irregularly distributed. The workmen meet frequently pieces which are too large to use, and, unable to cut them with chisels, are obliged to leave them in the ground.

resembling coal in appearance," and is said to be plentiful. The license which is given for the exploitation of a silver-mine stipulates, that the proceeds be divided into three portions, one "for the Emperor," one "for the mandarins," and one for the owner. Soldiers are stationed at the mine to watch the extraction. But there are so many sources of annoyance, that the production of silver is almost stopped. Firstly, the owners are robbed by the workmen. Then, the different corporations keep a sharp lookout at each other, and as soon as, at a mine which employs few men, some metal is ready for shipment, the men of another mine, who are stronger in number, attack those of the first and rob them of their gain. These two sources of danger are said to be surpassed by that which accrues from the presence of the soldiers, who are the most dreaded thiefs. Finally, when, after having got safely through all these dangers, the owners start with their hard-earned share of the proceeds to Chau-tung-fu, the next great market place, their purpose is known beforehand, and they are watched and frequently robbed on the road. It is evident, that silver-mining cannot flourish under such circumstances, be the mines ever so rich. Nor is it possible to discover a remedy, in a country where the government would have a difficult task in trying to appoint, to such a tempting place, mandarins and officers who are not corrupt and soldiers who are not lawless.

Gold is washed in many rivers, but chiefly in the Yang-tse above Sü-chau-fu, which is known only by the name of "Ki n-sha-kiang" or Gold-sand River. Below the place where it is joined by the Ya-lung-kiang, the earni ngs of those engaged in the occupation are very small, and every other kind of labour is preferred to gold-wash ing. Above that place, the proceeds are said to be larger, and the average size of the grains of gold to increase, probably because its prime source is approached. There are a few places in Yünnan where gold occurs in ores, and was formerly the subject of mining; and it is said to be extracted at Hwui-li-chau, together with the copper.*

Lead is of frequent occurrence in Yünnan, including Wei-ning-chau. As long carriage by land would rapidly increase its price, every market is provided from the least possible distance only. Sü-chau-fu draws its supplies from Yung-shen-hien in Chau-tung-fu, situated at little distance from a navigable affluent of the Yang-tse, which empties below Ping-shan-hien. The price (Tls. 5.5.0 per picul at Sü-chau-fu†) is too high to allow the profitable shipment of the lead to any place beyond the limits of Sz'chwan.

Spelter or *Zinc* (pè-yuen), is an important product of Western Sz'chwan. The chief place of its extraction is Han-yang-kai, 20 *li* from the city of Tsing-ki-hien in Ya-chau-fu. Lead (hé-yuen) comes from the same locality. The mines are reported to belong to the Government, and both kinds of ore have the Government stamp. Of lead alone, 5,000 piculs was reported to me as the annual extraction, and of zinc it is believed to be considerably more. The market for both is Ya-chau-fu; but much of the zinc goes to Sü-chau-fu; it is in flat square pieces of 50 catties, and has a very perfect crystalline fracture. Zinc is also made in Ta-ting-fu in Kwei-chau; the market for it is Jin-hwai-ting. But, owing probably to the long journey by land from the mine to the market, the production is

* It will be noticed that, in my letters on various provinces of China, I have very seldom made mention of the occurrence of gold, while, to judge from the statements of many writers, the Empire would appear to abound in that metal. And indeed, if the number of places in which gold is known to occur and forms, at present, the subject of extraction from the soil, were to be considered as a measure of wealth, China would be among the first gold-producing countries in the world, and be, perhaps, ahead of California. Mr. Pumpelly's valuable tables of places in which, according to Chinese books, gold is found, give 64 departments distributed in 14 provinces; and it would not be difficult to increase these numbers by consulting the reports of travellers. From my own experience on the subject, I have arrived at the conviction, that the great number of places in which gold is washed from river-sand, in China, at the present day, far from furnishing a proof of the wealth of the country, is, on the contrary, clear evidence of the superabundance of human labour, the general prevalence of relatively low wages, and the poverty, individually, of those engaged in the search for gold. It is not at all unlikely, that the early settlers in China had better returns from the same occupation, because the gold had accumulated in the river-sands through countless ages, before their arrival; but the gold-washers of to-day, with probably very few local exceptions, earn less than the lowest wages which they can get for ordinary labour, and take to that occupation in those seasons only when there is the least demand for field-work. We can therefore safely conclude, that (with those few exceptions), the greater the yield in gold, the greater will be the poverty of any one province. The sum total is, in some over-populated countries, not inconsiderable, and has quite misled the judgment of those even who have witnessed the miserable condition of the gold-diggers. It appears, indeed, that Yünnan, together with the rest of the metalliferous country, is the only portion of China where the gain, which gold has brought to those who have been engaged either in mining for it or in washing it from the sands of rivers, has been such as to compare favourably with that obtained from other industrial enterprises. The number of places in which gold occurs in the various hilly countries of Europe is probably greater, on an average, than an equal area's of China. But no notice is taken of them, because nobody could be induced there to wash gold with so little returns as are generally obtained in China, if Yünnan is excepted.

† This statement is doubtful.

small. Zinc is used for various purposes, for instance, for making rifle-bullets, and, alloyed with copper in various proportions, for making brass, cash, and casting guns; it is also alloyed with white copper, as above remarked.

Tin.—The most prolific mines from which this metal is derived at present are situated in the department of Ling-ngan-fu, in the south-eastern portion of Yünnan. It comes into the market in the shape of small truncated pyramids weighing about two catties a piece. There are several varieties of tin, owing to the admixture of other metals. The most valued of them (tsien-si) gives a ringing sound. I did not learn positively whether tin occurs also in Kwei-chau, but it is said to have been mined formerly at Tang-yue-chau in Yünnan. I failed to get reliable statements of the prices of tin and zinc.

Iron is largely distributed through Yünnan. None of it goes to Sz'chwan, since this province is itself well supplied with it.

If the list of localities, as given here with reference to the various metals, is completed by the extremely valuable tables of places at which useful metals and minerals occur in China, published by Mr. Raphaël Pumpelly, then the area through which copper, silver, lead, tin and zinc are distributed, in deposits of sufficient concentration to form the subject of mining, comprises, at least, 80,000 square miles. Within it, no metals occur on the plateau itself. The mineral ores are found in those rocks which underlie the red sandstones and are exposed on the sides of the deep cuts through which the plateau is drained, as before described, and in the rugged defiles of which the country is said to consist in those places where the cover of the red sandstones is removed by denudation. While China, throughout the rest of its area, is remarkably poor in metals other than iron, it appears as if the total wealth due in respect to their occurrence to so large an Empire were concentrated in this one connected region in the extreme south-west. There can be little doubt, that the ores are generally of good quality, and that the mode of their occurrence is, in numerous places, favourable for easy and cheap extraction; the first, because the Chinese possess an exceedingly limited knowledge of metallurgy, and the other, because with their simple modes of mining, and the inferior quality of their tools, and without using any blasting-powder, they are able to sell the copper at the smelting works at a remarkably low price. It is probable that China possesses, in the metalliferous region of Yünnan, a source of wealth which she has scarcely commenced to make use of. The position of most mining places is unfortunate as regards the transportion of the less valuable metals to shipping places, and the duties upon, and other privileged and non-privileged oppressions of, the metal trade are so onerous, that they would be equal to prohibition in other mineral countries; but these are obstacles which are not without prospect of being remedied in the future.

Other Articles of Export from Yünnan.—Besides the metals, there are several important products which leave Yünnan by way of Sü-chau-fu, even under the present disturbed circumstances. The following among them deserve some special notice:

Po-'rh Tea.—An extensive region in southern Yünnan, adjoining the boundary of Anam, and mostly inhabited by non-Chinese tribes, produces a sort of tea which enjoys an old-established renown throughout China. It extends eastward to Mong-tsz'-hien. But its centre is the department of Po-'rh-fu, and from this the tea has derived its name. The Po-'rh tea is distributed for consumption throughout Yünnan, but forms also the subject of a considerable commerce, by way of Sü-chau-fu, to Sz'chwan and regions beyond, and is carried by the long land-route as far as Peking. I known of no article of trade in China, that increases in price so rapidly as this, with the distance from the place of production. It is made up in small cakes, seven of which are wrapped in palm leaves, so as to form a drum-shaped package (*ch'ou*), weighing 3½ catties. Thirty of these *ch'ou*, weighing about one picul, are called a *tiau*. The price at the place of production is Tls. 7 to 8 per *tiau*. On its journey to Sü-chau, the tea passes upwards of twenty stations where duties are exacted, mostly from the chiefs of small independent districts. The sum total of these taxes is about Tls. 20. Adding the expense of freight, which is said to be no more than Tls. 6 per picul, on a journey by land of about sixty days, it is easily understood, how the price is raised to Tls. 33 to 34 per *tiau* at Sü-chau-fu (Tls. 26 at Yünnan-fu). Single packages are sold at Tls. 0.8 at Yünnan-fu, Tls. 1.2.0 at Sü-chau-fu, and Tls. 1.4.0 at Ching-tu-fu. This is the ordinary quality, of which the bulk of the export consists. Besides it, there exists a second quality, selling at Tls. 1 at Yünnan-fu, Tls. 1.4 at Sü-chau-fu (or Tls. 40 if sold by the picul), and Tls. 1.6 to 1.7 at Ching-tu-fu. Also at the place of production it is said to be sold at 2 mace above

the price of the other. The Chinese say, that this tea is more refreshing than any other kind, and, although strong, does not irritate the nerves as other green teas do, also that, if prepared in the Chinese way, it will bear seven infusions without showing any signs of being reduced in strength and delicious flavour. The excellence of the Po-'rh tea in these last respects, and its low price at the place of production, make it well worth a further examination ; the more so as I will try to show, that Po-'rh-fu, although at great distance from any riverport in Chinese waters, is well situated in regard to another and much shorter outlet.

Opium.—The *Nan-tu*, or opium from Yünnan, ranks, in the opinion of the Chinese, next above that from Sz'-chwan and Kwei-chau, which, as I have said, is unanimously declared the lowest in quality of all kinds. The cultivation of the poppy on a large scale is said to have commenced in Yünnan at least sixty years ago, and in Sz'-chwan about 25 years later. The best is raised in Ta-li-fu and near Hwui-li-chau, that from the latter place being comprised in the denomination "Nan-tu." It is "dry and of yellow colour," which are considered desirable properties. The Nan-tu costs at present Tls. 14 per 100 taels weight at the places of production. An aggregate *li-kin* of Tls. 1.6.0 is paid on the various customs-stations on the road. It is sold at Sü-chau-fu at Tls. 16 to 17, but sometimes the price is as low as Tls. 13. The amount of annual importation is large, and stated to be considerably over one million Taels in value. The Yünnan drug is chiefly consumed in the cities next to Western Sz'-chwan, ranging from Sü-chau-fu to the plain of Ching-tu-fu. It is said that the poppy is a remunerative crop in the mountainous regions of Yünnan, because grain crops are apt to fail, while the poppy succeeds almost invariably.

Medicines, in the shape not only of herbs and roots, but also in those of fossil shells, bones, teeth, and various products of the animal kingdom, as it exists in the tropical regions bordering on Yünnan, figure largely among the articles of export from Yünnan, at Sü-chau-fu.

Precious Stones.—On the strength of the statement of ignorant Chinese, Yünnan is sometimes considered as a region abounding in precious stones. This repute is founded in the circumstance, that Yünnan is for most Chinese the *Utima Tule* of their geographical conceptions, and that indeed a considerable proportion of the gems used by the Chinese are furnished by the trade of that remote province. Most of them, however, are derived from regions beyond Yünnan ; chiefly Burma *(Mien-tien)*, which is at present the chief source of the jade, besides supplying sapphires, rubies, common corundum, emeralds, &c. The mountains of Yung-chang-fu and Li-kiang-fu in western Yünnan are, however, reported to furnish jade and "*fei-tsui*," which is a high-priced variety of the other, and it is said that rubies are found on one of the high mountains of Ta-li-fu. The trade in precious stones was formerly directed to Canton, and what remains of it appears to go still by the same road ; at least, that city is well provided with the jade from Burma, and none of it passes through Sü-chau-fu.

Imports of Yünnan.—Those imports which Yünnan takes from Sü-chau-fu, and which alone can be here considered, consist chiefly of cotton from Hupè, cotton piece-goods made in Sz'-chwan, some foreign piece-goods, and silk from Kia-ting-fu and Ching-tu-fu. Yünnan produces a trifling amount of cotton, but no silk. A fair balance of trade appears to be established by these articles. Besides them, some white sugar and tobacco are imported, as Yünnan (or at least its eastern portion) produces only inferior kinds of both ; also medicines, and a few other articles of purely local interest.

Trade Roads of Yünnan.—Taking Yünnan as a centre, trade-roads go off in all directions, but are few in number. Beginning from the west, we have :

1st—*Road to Bhamo in Burma.*—From Yünnan-fu there are 12 days to Ta-li-fu, and in 8 days more Tang-yuĕ-chau is reached, whence the road to Bhamo is well known by the description given of it by Major Sladen, with which I regret to be not acquainted. The entire distance from Yünnan-fu to Bhamo is probably 28 days, and only little in excess of that from Yünnan-fu to Sü-chau-fu. It is an easy road as far as Ta-li-fu, but beyond that place the difficulties are said to be very great, since high mountain-ranges and the deep-cut river-beds of the Lan-tsang-kiang and the Lu-kiang or Salwén must be crossed in succession. It is well known that various ways have been proposed, by which both natural and political difficulties connected with the re-establishing of this old road and its turning into efficient account for foreign commerce, might in some measure be avoided. But—in consideration that the commerce of Bhamo could, in no case, aspire to supply more than a portion of Yünnan, and perhaps, the department of Ning-

yuen-fu in Sz'-chwan—it is not probable that a road will be found, that does not present natural difficulties in too great a measure as to be able to remunerate the expense of constructing a railroad, which is the avowed ultimate object of the explorations and propositions. The great task would have to be overcome, of connecting, by an easy grading, the low country on the banks of the Irawaddy with a very elevated country, deeply intersected in various places, (and chiefly there where the ascent would necessarily take place), by large rivers flowing at right angles, or at least obliquely, to the direction which the intended roads would necessarily take.

2nd.—*Roads from Ta-li-fu and Li-kiang-fu to Batang.*—It appears that two roads exist which connect these places : one on the left bank of the Kin-sha-kiang, and one on the right bank, the first of which is more important than the last. They establish the connection between Western Yünnan and Tibet, and are of interest for foreign commerce, if the possible chances of the Bhamo road for supplying Tibet are taken into consideration. The plain fact, that the distance of Bhamo from Batang, by way of Tali, is about double the distance between Batang and Ya-chau-fu, which, as I have shown, is the highest shipping place on affluents of the Yang-tse in the direction of Tibet, makes it probable, that the Bhamo road would have no chances of competition with the other.

3rd.—*Road from Tali, by way of Kienchang, to Ya-chau fu and Ching-tu-fu.*—I have given in previous pages some particulars regarding this formerly important road.

4th.—*Road from Yünnan-fu to Sü-chau-fu.*—This is, at present, the most travelled and most important road of all. It is calculated at 24 *tsan* or stations, of 50 to 80 *li* each, viz., 6 to Tung-chwang-fu, 6 from there to Chau-tung-fu, 3 thence to Ta-kwan-ting, 3 to the mart Lau-wu-tan, and 6 to Sü-chau-fu. From Yünnan-fu to Lau-wu-tan, coolies or small ponies are employed, from there to Sü-chau-fu only coolies. The cost of freight is, Tls. 2.6.0 per picul to Chau-tung-fu, and Tls. 2.8.0 from there to Sü-chau-fu ; or Tls. 5.4.0 for the entire distance. A picul is allowed to have from 110 to 120 catties.

5th.—*Road from Yünnan-fu through Kwei-yang-fu to Wang-ping-chau in Kweichau, and down the Yuen-River to Chang-te-fu in Hunan.*—(See my "Letter on Hunan" p. 9.) It is not in use at present on account of the troubles in Kwei-chau.

6th.—*Road to Canton.*—This is an ancient and important trade-road, which has come into disuse since a few years only, on account of the insecurity of travel in western Kwangsi. The land travel was, 12 days from Yünnan-fu to Mong-tsz'-hien, which is an important centre of trade, and 8 days from there to Pè-sè-fu on the Canton west river. From there, the journey was continued to Canton by boat. This last portion required about 20 days in going down-stream, and 42 in going up (8 from Canton to Wu-chau-fu, 18 to 20 from there to Nan-ning-fu, 14 from that city to Pè-sè.) The metals of Yünnan, the jade and gems of Burma, the musk of Ta-tsien-lu, and many other articles of that remarkable through-trade which passed through Yünnan from west to east, went formerly by that route. At present it is not even used by travellers.

7th.—All the roads here enumerated involve long, laborious and expensive travelling and carrying by land, and are of a nature tending to impede, rather than to develope, the commerce and resources of Yünnan, the more so as the most valuable products of that province are metals which cannot bear a long transportation by land. So long as they only exist, and even in the case that they should be improved, and some of the difficulties be removed which attend the voyage on the Yang-tse and other rivers, Yünnan will remain an almost sealed-up country for commerce. There is however, another route which, though indeed not existing till now for any purposes connected with foreign commerce, promises to become of much importance in the future. The report has long been current, that Yünnan is directly connected with the sea by a navigable river. It is that marked on foreign maps as the *Songka river*, which empties into the sea in the gulf of Tongking. If the report should be true, then the whole territory of eastern and southern Yünnan would have an easy outlet to the sea. The tin of Ling-ngan-fu, the tea of Po-'rh-fu, the various metals which are mined in different portions of the country, would reach the sea without difficulty, and foreign imports could enter Yünnan by the same road. In view of this probably existing but not developed trade-route, the impending opening of Hainan appears to be an important event. From it, as a basis, the present state of the mouths in the Delta of the Songka might be examined, which were navigable for deep-going vessels when, first the Portuguese and Dutch, and later, French and English merchants were established at the city of *Hien*, at the head of the Delta of the Songka. It is true, that the number of the inhabitants of Yünnan is not

very great, and that the other regions which would be opened by the Songka river, with the exception of the rich plain adjoining its lower course, harbour a thin population. Yet, a country abounding in metals, and capable of producing copper at $160 a ton, is certainly deserving attention in no ordinary degree.*

11.—*CHUNG-KING-FU, AND THE PROVINCE OF KWEI-CHAU.*

The Yang-tse, between Sü-chau-fu and Chung-king-fu, is so well known by the descriptions of it given by Capt. Blakiston and Rev. Mr. Wylie, that there is no need to dwell on it more particularly. The only important place on the left bank is Lu-chau, at the mouth of the To-kiang, a great market of sugar and salt, and the chief Customs-station. On the right bank, there are two cities, Na-ki-hien and Kiang-hien, situated at the mouth of rivers which descend from Kwei-chau, and mediating a portion of the commerce of that province. Yung-ning-hien and Jin-hwai-ting mark the head of navigation of the two rivers, and are the collecting and distributing places for Kwei-chau. Small boats only are employed for the traffic on these and several other less important rivers. The chief marts on the Yang-tse for the commerce of Kwei-chau are, Sü-chau-fu and Chung-king-fu, but more especially the latter, which is also the focus of the greater portion of the trade of Sz'-chwan.

Chung-king-fu is a large city, very populous, and one of the chief centres of trade in China. The number of inhabitants is given as 700,000, which, if correct, would put it only 100,000 below Ching-tu-fu. These people live crowded on an area no more than one half of that occupied by the capital. In point of beauty, comfort, width of streets, elegant house-fronts, aristocratic appearance, and predominance of articles of luxury, Ching-tu-fu is much a-head of Chung-king-fu ; but this is thoroughly a commercial city, with a great deal of shipping, and direct connections with many of the chief places of the Empire. It has great banking houses and wealthy merchants, who do business on a large scale. But the wealth derived from commerce is, as I have remarked on another page, chiefly concentrated in the hands of men from other provinces, viz., Shansi, Shensi, Kiangsi, while that of Ching-tu-fu is more generally distributed among natives of Sz'-chwan. Considering its relative importance as a place of commerce, Chung-king-fu ranges, in the opinion of the Chinese, considerably below Siang-tan in Hunan, and as regards the quantity of shipping, the comparison is undoubtedly correct. Two causes may be assigned to this relatively inferior rank. Firstly, there is, as I have said, a not inconsiderable trade carried on directly between the marts of Hupè and some cities situated above Chung-king-fu, as Lu-chau, Sü-chau-fu, Kia-ting-fu, and even Ching-tu-fu. Then, the commerce of Sz'-chwan, as a whole, appears to have not arrived at the same state of development as that commanded by Siangtan. This is established since very ancient time, while Sz'-chwan has grown during the present dynasty into what it is at present. The resources of the country were to be developed gradually, and the commercial development did probably proceed at a similar rate. Siangtan, owing to its commanding position on the highroad from south to north, had every commodity put within easy reach, and the commerce could take a definite character at an early epoch, and then progress in the once established lines, at the same rate as the exports of tea and coal increased. Such is not the case in Sz'-chwan. By the bounty of nature, assisted by their own industry, the people of that province were enabled to arrive at a high state also of external refinement, in making use of no other commodities than those available for them among the products of their own country. Situated, as it were, on one of the extremities of communication, they have failed to discover all directions in which they would be able to satisfy their latent wants, scarcely known to themselves. It is for this very reason, that foreign commerce has a fine field before it in Sz'-chwan, since it may supply that which is missing, more perfectly than the industry of the neighbouring provinces of China is able to do.

* After the conclusion of this letter, I have had the pleasure of an interview with one of the most enterprising and skilfull mordern travellers in China, Mons. Dupuy, and was surprised to learn from him, that he has, a short time ago, been to the Songka river, and descended it by boat from the head of the navigation a long way down. It is the merit of his laborious researches, to have solved the problem, and proved the truth of the report which I have mentioned above, and which had already attracted the attention of those admirable explorers, the gentlemen of the French Mekong expedition. They had not been so fortunate in regard to this important subject as their indefatigable countryman was in 1871. He discovered, that from *Mong-tsz-hien*, the trading centre above mentioned, which is still situated on the plateau, a two days' journey, including a long and steep descent, leads to a small affluent of the Songka, where the navigation commences at the mart *Man-hau*. The river is there enclosed between steep mountains, interrupted by very fertile valleys, in which rice and sugar are cultivated, and is navigable to the sea. He puts Mong-tsz-hien at only 10 days' journey from Yünnan-fu. The distance of the capital from the head of navigation would, therefore, be no more than 12 days, against 28 days from Bhamo and 24 days from Sü-chau-fu. Although steamers will probably not be able to go very high up on the Songka river, the fact, that its head-waters are situated in the heart of some mining districts of Yünnan, is of sufficient importance, because the river may become a means to transport the metals to the sea at low rates of freight. An additional interesting result of Mons. Dupuy's observations is this, that in the department of Ling-ngan-fu, coal is of frequent occurrence and forms the subject of mining. Much other valuable information regarding those regions is to be expected from the intelligent observer who kindly gave me these notes.

The position and commercial importance of Chung-king have been illustrated, and the commerce thoroughly and minutely treated, in the "Upper Yang-tse Report." Nothing remains for me to add on these points. Also as regards the notes on the province of Kweichau contained in the same document, I found the information conveyed in it substantially confirmed in every particular. The rebellion in Kweichau has indeed no connection with the Mahomedan insurrection of Yünnan, with the exception of the above mentioned department of Hing-i-fu, in the extreme south-west of the province. Nor is it the Miau-tse or other aboriginal tribes which instigated the revolt. The emigrants from Kweichau, who are numerous in Sz'-chwan, are unanimous in ascribing the outbreak to the Chinese themselves. When the troubles had commenced, the province remained infested by lawless bands roving through the country, and robbing and killing the peaceable inhabitants. This state of things has prevailed since 1848. At present, the insecurity of residence is no longer ascribed to those banditti, but to the great number of badly officered and undisciplined Imperial soldiers who infest the province. The Miau-tse—the cruel extermination of which, in those districts where they can easily be crushed by an overwhelming force of soldiers, appears to be at present the avowed aim of all operations, and the invented pretext of the officers who desire to remain in a lucrative employment —are highly praised by those Chinese who have had intercourse with them or resided among them, chiefly on account of a certain generosity and liberality of character, which appear to distinguish them from the Chinese. It is, however, added, that they are soon roused when they discover that they are treated with injustice. This they have suffered in a flagrant degree on the part of the soldiers, and it is no wonder if they try to retaliate cruel treatment. A war has thus been artificially created which has no prospect for termination. Since a number of years, the Miau-tse hold possession of several *fu* and *hien* cities near the frontier of Hunan; the valour of the troops, which are kept at great expense in Kwei-chau by the Imperial government, and which cause a much greater indirect loss, by checking the cultivation of the fields and, generally, the development of the productive power of the province, was not sufficient for re-taking those cities, and their highest exertion appears to be, the oppression of the peasant, and the cruel putting to death of those few Miau-tse whom they can get hold of without risking their own life. So long as this state of things lasts, Kweichau will continue to be the least productive, the least populous and the least important among the eighteen provinces of China.

Kweichau did temporarily revive in 1862 and 1863, when Sz'-chwan itself was in a troubled state. Many people from the neighbourhood of Sü-chau-fu and other places on the Yang-tse went there, with the intention to settle permanently; but the majority of those who were not killed or did not die from disease returned during the following years, and the central departments of Kweichau are believed to have retained no more than thirty per centum of the total population which they had in 1863. Living is described as very cheap in that province, all articles of food costing only half of the price which they have in Sz'-chwan, in ordinary years. But the climate is said to be very unhealthy. The country has little running water, but much which is stagnant, and only those who are born there can withstand the effects of the malaria which it creates. To this circumstance is ascribed the fact, that the population of Kweichau has always been thin The climate has deteriorated since the commencement of the troubles, because it constantly happens that corpses of killed are putrifying on the fields. The drinking water of wells is considered as particularly unhealthy. Although mountainous, the country is said to contain more level ground than Sz'-chwan in the neighbourhood of the Yang-tse, but it is not well adapted for the cultivation of rice. Opium is raised, but not in large quantity; in quality it is rather inferior to that of Sz'-chwan. The best portions at Kweichau appear to be, the plain of Kwei-yang-fu and, next to it, some regions in Ta-ting-fu, and Tsun-i-fu. The last did formerly belong to Sz'-chwan, and is still more closely connected with this province than with the rest of Kweichau.

The natural outlet for the products of Kweichau is the Yuen-river in Hunan. It is navigable at Wang-ping-chau, a city situated at a short distance from its source, but now in the hands of the Miau-tse. A few Chinese merchants are tolerated by these, and some commerce continues to go down the Yuen river. Chung-king-fu, though now the chief market, is, in ordinary times, second in value as a port for Kweichau produce, and does mainly the commerce of Tsun-i-fu and a few other departments in the north.

After having mentioned, in another chapter, the products of Wei-ning-chau in the west, which consist in copper, silver, lead, and zinc, two other articles of produce only deserve further notice—viz, quicksilver and wild silk.

Quicksilver has been, from of old, the chief commercial product of Kweichau. At the beginning of the present century it was still among the regular articles of export from Canton. Then it failed, and became an article of import, rising gradually in quantity, until it reached the figure of over 10,000 piculs, in 1831 and 1832. Suddenly the Chinese did no longer require the foreign quicksilver, and from 1838 commenced again to export it. This state lasted till about 1849. Since then it has become again a regular article of import. But the quantity required is much less than in former years, and is about 3,000 to 4,000 piculs annually. These alternating flood and ebb tides were probably caused by the periodical disturbances in Kweichau. When the last one commenced, in 1848, the mines were abandoned, and they have not been re-opened since.

The places where the quicksilver occurs appear to be limited to a well defined belt, which extends through the whole province, from south-west to north-east. One of the principal mining districts, and the only one in regard to which I was able to get some information, was Kai-chau (in Kwei-yang-fu). The mines were scattered there on an area of ten *li* diameter. The works were entered by inclined shafts, and some were extensive. I was unable to get a clear idea regarding the mode of occurrence of the ore; but it is said to exist in considerable quantity, and to have been difficult to mine only on account of the presence of much water. The extraction of metal is vaguely given as 25 per centum of the weight of the ore, which is probably an exaggeration. The daily extraction in the district was (according to my informant) 20 to 30 piculs. The metal was sold at the mines for Tls. 32 per picul, at Chung-king-fu at Tls. 50. At present, much imported quicksilver is sold. Its nominal price, at Chung-king-fu, is Tls. 110 per 100 catties of 16.2 taels each; but the actual price to those engaged in the trade is Tls. 81.3.4. The mines of Kai-chau are now filled with water. It is intended to re-open them, and the governor of Kwei-chau desires to participate in the enterprise. If the mines are really what they are reported to be, if quicksilver can be produced now as cheaply as it was before 1848, and if mining is done on a grander scale than before, then the trade in quicksilver may again become large and important, and China may export a much larger quantity of it than she did formerly. The mines of Kai-chau have the advantage of being situated near Wang-ping-chau; the metal can therefore conveniently and cheaply be shipped to Hankow. If the Chinese government should succeed to restitute order, and security of life and property, in Kwei-chau, one not unimportant branch of trade at least has a fair prospect to attain some magnitude, irrespective of any other development of the resources of the province. The number of places, at which quicksilver is found and was mined, is so great as to make it not improbable, that, in respect to the quantity of this metal awaiting extraction, Kwei-chau is far a-head of any other known quicksilver producing country on the globe. In many places, Cinnabar is brought to the surface in ploughing the fields. This mineral, besides Realgar and Orpiment, form the rest of the former mineral exports from Kwei-chau. Ores of copper, lead, and silver are reported to be of frequent occurrence, among other places in the region of Kai-chau; but I know nothing definite in regard to them, and, with the exception of Wei-ning-chau, they did never, or at least not lately, form the subject of mining in any locality. The spelter of Ta-ting-fu should be excepted, although it has almost ceased to be produced.

The province of Kwei-chau contains also *coal;* but, so far as I was able to get information in regard to it, it is only anthracite of an inferior quality.

Wild Silk.—This is the only product of value from the department of Tsun-i-fu, where its manufacture occupies many hands. The best silk is sold at Tls. 0.0.8 to Tls. 0.0.9 per tael, at Tsun-i-fu; it is woven into pieces 58 Chinese feet long, and 15 Chinese inches wide, which is just sufficient for two long robes of an elegant Chinaman's dress. Three kinds of these piece-goods are made. The ordinary heavy kind weighs about 32 taels; its price is Tls. 0.1.25 per tael, or about Tls. 4 a piece. This is considered the best Pongee of China,, and as much superior in strength and durability to that from Shantung. The second kind is thinner, weighs about 24 taels a piece, and is sold at Tls. 0.1.4 per tael; most of it is dyed. The third is very coarse and cheap, but only locally consumed. The trade in the first quality is estimated by those engaged in it at about Tls. 500,000 a year, and that of the other two kinds together at nearly the same. Most of the first and second kinds goes to Chung-king-fu, and thence to other regions, chiefly Shensi, Shansi, and Peking, where it is largely used. A considerable portion is sent directly to Siangtan, and some, on land-routes, to Kwangsi.

12.—*THE YANG-TSE, FROM CHUNG-KING-FU TO I-CHANG-FU.*

The Report of your Delegates to the Upper Yang-tse has put you in possession of full information regarding this portion of the river and the general commercial relations of the cities situated on its banks. Much is also known from previous descriptions, chiefly that given by Capt. Blakiston; his admirable chart of the Yang-tse, from Hankau to Ping-shan-hien (a distance of 1,107 miles), is deserving of the highest appreciation, chiefly if it is considered that it is the work of one single individual, and was executed within the short space of five months. I descended in my boat, with the rapid current, halting only occasionally for the purpose of a geological ramble. As this mode of travelling did not give me the best opportunity for increasing the stock of knowledge which is accumulated from so competent sides, a few brief notes concerning the views at which I arrived from my own limited experience will be sufficient on this occasion.

The beautiful scenery of Sz'-chwan Proper, the air of comfort, wealth and refinement pervading even the rural districts, the gentle slopes richly covered with green fields and plantations of valuable or ornamental trees and shrubs, the forests of orange trees extending on the banks of the river, the frequency of temples and sacred shrines built in conspicuous places under groves of gigantic fig-trees, the busy appearance conveyed by the numerous farms scattered on the slopes and connected by a net of paved foot paths—all these charms of the scenery cease at Chung-king-fu. The river below that place is cut deeper; the slopes descend at a higher angle; the strata of the rocks, and with them the surface, are made up into regular folds striking parallel to each other, from south-west to north-east, and culminating in ridges of from 2,500 to 3,500 feet elevation above the river. Till Kwei-chau-fu, the harder rocks (limestone) form only the axial cores of the ranges, and soft rocks prevail; also does the river flow predominantly in a direction parallel to the ranges, in the long troughs which separate them. But the true surface of these, too, lies high above the bed of the river, which flows in deep and gloomy canals cut into the horizontally stratified red sandstone. Little space only is left for human habitations. Below Kwei-chau-fu, the scenery becomes grand, because there the river intersects the folds at right angles, and the ancient and, mostly, very hard rocks which I have described as encircling the Red Basin, and constituting its under-structure, become, prevailing at first, and then sole constituents of the mountains. It is, in fact, the direct continuation of those mountain-ranges which constitute the northern half of the province of Kweichau and impart to it an inhospitable character, which is here crossed by the Great River. The limestone, which takes part in their composition in the shape of long rugged ranges, is cleft in narrow chasms directed transversely to them, and the whole volume of the water is forced into the small compass which the vertical walls allow it to occupy. These are the famous gorges of the Yang-tse. Between the limestone-belts, others are enclosed of a more gentle character of surface, and made up of a variety of rocks which I will not further detail. Where the river crosses these belts, the rapids occur. They are occasioned by certain obstructions put in the way of a continuous descent, and consisting, in some places, in a slight bending up of some hard strata, in others, in veins of a hard syenite which intersect soft granite. In either case, these rocks form a natural weir, which stows up the water, and then causes it to descend more rapidly.

In the whole course from Chung-king to I-chang, the Yang-tse receives only one large affluent. It is the Kien-kiang, which empties on the right bank. This river descends from the western borders of Kwei-chau, and flows through the whole extent of that province, but is navigable only from the place where it leaves it, which is 520 *li* distant from Fu-chau, a large city built at the place of its confluence with the Yang-tse. The communication established by it with Chang-te-fu in Hunan is described in the "Upper Yang-tse Report." It does not exist since long time, as it dates from the time of the subjugation of the independent tribes of Yu-yang-chau. That region is still occupied by a rude and semi-barbarous population, not friendly either to foreigners or Chinese mandarins. The route is not of much importance, because the rivers on both sides of the land-passage of Yu-yang-chau are wild mountain-streams. The Kien-kiang is navigated by small boats only, expressly built for shallows and strong rapids. All the other affluents of the Yang-tse are small, and though every one of them appears to be navigable in one or other portion of its course, they drain only wild mountainous countries; some of them flow through gorges more forbidding than those of the Yang-tse, and it is only by the aid of steep and inconvenient footpaths that the inhabitants have contrived to establish connections between the gloomy dens in which they live and the principal marts on the Great River.

Yet, such is the bounty of nature in Sz'-chwan, that it has rendered even this wilderness susceptible of producing in quantity some of the most valuable articles which constitute the wealth of this remarkable province. Chief among them are : Opium, of which Fu-chau is the principal market for export-trade ; Tung-oil, which is shipped from every mart on the river, but is produced in greatest quantity in those districts which are least fit for other crops ; salt, which is manufactured in various places between Wan-hien and Kwei-chau. Besides these are to be mentioned, Tobacco, Hemp, Tea, Silk, Coal, Iron, Rhubarb. Grain is raised in sufficient quantity to feed the population, in ordinary years. If the river should ever be opened for steam-navigation, this not unimportant produce could be collected at certain stations, as Kwei-chau-fu, Wan-hien, Fu-chau, or such others as might be selected on account of their affording a better anchorage.

Turning now to this point—namely, the prospects of introducing steam on the Upper Yangtse, I will no longer dwell on the paramount importance which such an improvement would have for the development of the commerce of Sz'-chwan, as it is too patent in the light which your Delegates in 1869 have so admirably thrown upon this subject. But so long as no thorough survey of the river is made by competent men, a non-professional traveller may claim the prerogative of presenting the impressions regarding the practical feasibility of the scheme, which he got by his own experience, however slight or doubtful their value may be for the ultimate solution of the question. The chief point is still this : is it practically possible, or not, to navigate the Yangtse above I-chang with steamers? When I descended the river, scarcely any rain had fallen in Sz'-chwan; and while, at Hankau, the water was at 30 feet above the lowest mark, owing to the copious rains which had prevailed in Hunan and Hupè during March and April, the river between Chung-king and I-chang was only a few feet above its lowest level, ten feet being the highest figure at which the difference was estimated by various persons ; and that was in a narrow gorge, where the total rise in summer is over 80 feet. The state of the river was, therefore, approximately that which it presents, on an average, between October and April, and the swiftness of the current much less than in the other five months. Also at that state of the water, the difficulties and dangers for ordinary navigation are great. Difficulties are experienced only in travelling up-stream, when the large boats are tracked through the rapids and gorges by bodies of coolies numbering often upwards of fifty men. Dangers may then accrue by the breaking of the line. But these exist chiefly in going down-stream. They are owing, not so much to the rapids themselves as to the eddies following immediately below each of them, where sometimes the entire surface of the stream from bank to bank is one countercurrent. Other dangers are caused by the whirls in the gorges, where the current is very frequently broken by rocks projecting from the banks. The skill with which the pilot at the helm manœuvres the ship through whirls and eddies, ordering it to be steered often in what would appear to the inexperienced the most dangerous place, is very remarkable. Still the most skilfull pilot cannot prevent the ship from whirling around occasionally. It happens then, that small vessels are completely engulfed, while larger ones may be thrown against the rocks. These dangers do not exist for steamers, because, going at a rapid rate, they can be steered without difficulty, and will generally make headway against a countercurrent, and overcome the laterally applied force of the whirls. The own rate at which a native boat goes down, that is, the velocity imparted to it by rowing, is seldom more than one mile, and in bad places, where the men work harder, two miles an hour, but the usual rate is probably no more than half a mile. The steering power is, therefore, very small, and hence arise the dangers. Nowhere will steam-navigation be easier and safer on the Upper Yangtse than in the gorges, and above and below the rapids, because the water is deep.

The difficulties which steamers have to meet are caused by the rapids themselves ; and the dangers are founded partly in the peculiar character of these, and partly in other circumstances. The rapids are few in number (probably no more than ten or twelve), and each one of them is short. The most violent, at the time of my journey, appeared to be the following three—viz., the first one above I-chang, the Sintan rapid, and one above Patung ; they are situated, respectively, 16, 32, and 62 miles from I-chang ; the first of

these, and another just above Shantauping, and 21 miles from I-chang, were apparently the longest ones. The velocity of the current is so great in them, that a correct figure cannot be arrived at by a mere estimate, because it would remain guess-work. It is, therefore, among the most important tasks, of those who may be hereafter engaged in surveying the river, to define accurately the velocity of those currents, as it is during the seven months of low water, and then during the different stages when the river is rising. If it should be too great for a steamer to run against, then, in the absence of any possibility of cutting a canal in the banks of the river, the only means of overcoming the difficulty would be the same which is applied by the Chinese in going up-stream—namely, the tracking up of the steamers, which may, however, for the sake of economy and safety, be converted into pulling, [perhaps by means of winding upon a cylinder fastened in the steamer herself a strong rope attached to a stationary object above the rapid]. The expensive human labour might thus be supplied by steam-power.

If it is possible to overcome the strength of the current in the three first named rapids, then there will be, during the seven winter months, no further difficulty from that source, on the whole way to Sü-chau-fu, and even as far as Kien-wei-hien on the Min river, because all other rapids are of less magnitude. The dangerous rapid above that place, though very short, is probably too shallow for steamers. Another difficulty, which may occasionally be a source of danger, is the scarcity of anchoring ground. The river is, however, too little explored to speak positively on this point. The greatest real danger, in the eyes of an occasional observer, must appear to be, the rocks in the river-bed. It exists at high and at low water. There are—to cite one out of many instances—long reaches where the river has, within its wide rocky bed, scooped out a well-defined narrow channel, which contains the whole volume of the water, in winter time. This singular feature is most perfectly developed above and below Wan-hien. The winter-channel is there encased in rocky banks with an uneven surface. At low water, navigation is perfectly safe ; but, during the time of rise and fall, and at high water, in fact as soon as the river commences to occupy its larger bed, it must be exceedingly difficult to keep the mid-channel ; and any deviation from it, except at the highest state of the water, must be fraught with dangers. Precisely the reverse is the case as regards the rapids. Aside from the difficulties attending the velocity of the current, no true dangers can be apprehended from them at high water, because the river-bed, although wide, is there not interrupted by rocks protruding above low water. But it is probable, from the nature of the rapids, that most of them are beset with small and sharp rocks projecting to very near the surface, at low water. If such should be the case, it will be an mportant task of any future survey, to determine exactly the best canals they may offer for going up or down.

Notwithstanding these obvious difficulties and dangers, the prospects that the Upper Yangtse will be found navigable for steamers, are not hopeless. The magnitude of the objects which are thereby to be accomplished should not be under-rated. A population, perhaps equal in number to that of Great Britain ; surpassing that of all other provinces of China in refinement, in average wealth, and in wants ; applying skill and industry in no common degree to the raising a quantity of valuable and very varied produce ; well adapted to the intercourse with foreigners ; commanding the commerce of two other provinces (Kweichau and Yünnan), and a portion of that of remoter countries (Tibet, Sifan country)—this population is connected with the rest of the civilized world by one inconvenient mountain-road (that of the Tsing-ling-shan), and one large river, the Yang-tse. That river is the outlet of the produce of the country, and its feeding channel as regards the supply from without ; it is the main-road of travel, and the only way by which the people can hope to have calamities such as the present mitigated, however imperfectly. Now, by overcoming a certain number of impetuous passages on an otherwise fairly navigable river, steamers can go amidst that population and penetrate into the heart of their country, or, at least, to regions situated from 1,100 to 1,200 statute miles beyond Hankau, richly supplied with cheap coal, communicating by water with all productive portions of the province, and occupying even now the position as the key to the commerce of the vast territories adjoining Sz'-chwan west and south. The produce of the country would then be carried, at cheap rates and

with comparative safety, to the great markets of Central and Eastern China, the imports would increase with the reduced rates of freight, and foreign goods laid at the door of a population to all appearance eager to receive them ; the terrible scourge, finally, attending the failure of the crops, would in future be reduced so as to have none but a temporary effect. This truly magnificent prospect is by no means reduced in magnitude, if we attempt to bring it down to plain figures, as well as the scarcity of available data will allow to do without exaggeration. I have shown in another page, that, taking cotton as the basis of calculation, the imports to Sz'-chwan on the Yang-tse amount probably to, at least, 600,000 piculs a year, and the exports to more than double* that figure. It is certainly no over-estimation, if we put the sum total of the annual traffic on the river between Chung-king-fu and I-chang-fu at a minimum of 2,000,000 piculs, considering only the ordinary articles of commerce. The freight, from Chung-king to I-chang or Sha-sz' is, down stream, 500 cash a picul, or Tls. 4.4.0 a ton, and up-stream, from 1,200 to 1,800 cash a picul, or about Tls. 10 to 15 a ton, according to the state of the river and the kind of goods contracted for (cotton being the highest.) We are, therefore, certainly within the mark, if we adopt the sum of Tls. 500,000 as representing the freight paid annually on upward-bound goods, and the same sum for those descending the river. From Chung-king to Sü-chau, freight is 5 cash a catty up-stream, and $2\frac{1}{2}$ cash down. If the total traffic on that portion of the river is put at 1,000,000 piculs a year, the expense of freight is about Tls. 333,000. Besides these large sums paid for cargo, considerable amounts are expended for travelling, partly by merchants going in passenger boats, and partly by Mandarins. The carrying traffic can therefore be safely put at Tls. 1,500,000 a year. The prospects which steam-navigation has, from a business point of view, in supplanting the frail, expensive, and unsafe native craft on this well and firmly established line of traffic, are, therefore, of no ordinary kind.

Since the time of the spontaneous labours of Captain Blakiston, very little has been done towards getting correct and reliable statements, such as are founded on exact observation and expressed in figures, concerning the capability of the Upper Yang-tse for steam-navigation, and the absolute amount of dangers and difficulties to be encountered. It cannot be expected that any practical steps in advance, in the way of real enterprise, can and will be made, so long as vague opinions only are the basis on which the risks would have to be taken. The result of all combined testimony on the subject goes to show, that a certain amount of difficulties exists which are near the limit of those which can be overcome by the existing means of steam-navigation, and may be slightly above, or slightly below it. If above, then all idea of improved communication on the Upper Yang-tse, of residence of foreigners in the interior, of rapid enhancement of the relations with Sz'-chwan must be given up for the present ; if below, then the speedy extension of foreign relations in the direction of the Upper Yang-tse is certainly the most desirable object among all which concern the introduction of measures for increasing the intercourse with China, because it is the most powerful means of doing a large step in advance, with the prospect of success, before the time of building railroads shall have come. A thorough and accurate survey of the Yang-tse between I-chang and Chung-king, and, if possibly till Sü-chau-fu, is, therefore, of like importance to the foreign merchant, the manufacturer at home, the producing and consuming community of Sz'-chwan, and the Chinese Government.

If the difficulties are too great, and steamers are to be excluded from the waters of the Upper Yang-tse, then the construction of a railroad will, in the course of time, be the only means by which Sz'-chwan can hope to rise to that commercial position which is due to her. I have observed, in another chapter, that the construction of a railroad is all but impossible there, where such a connection would be looked for first,

* That this is no over-estimation, will at once be evident, if a few figures are considered. The Tung-oil, which left Hankau in foreign vessels in 1871, amounted to nearly 300,000 piculs. If to this sum is added the quantity of the same oil imported for consumption in Hupè, chiefly Sha-sz' and Hankau, and shipped from there northward, and that which is shipped directly to Hunan, a high figure is arrived at, which may be put down at certainly no less than 600,000 piculs. If it is, then, considered, that the amount of Sz'chwan sugar sold at Hankau was estimated in the "Upper Yangtze Report," for 1868, at 270,000 piculs, and that of Tobacco at 50,000 piculs ; that these same articles are largely imported to other markets ; that some weighty articles, as hemp, salt, medicines, cannot be estimated, and, together with copper, spelter, and other metals, as well as opium, silk, white wax, &c., are chiefly consumed in the inland provinces, and go in comparatively small quantity to the sea, then it is quite evident, that a higher figure than that above named might be safely adopted to represent the bulk of the downward-bound trade between Chung-king-fu and I-chang-fu.

namely in the line from I-chang to Chung-king, and from there to Ching-tu, and pointed out, that explorations, when the time for them shall have come, will have to be made in quite other places.

In conclusion, I will remark, that the merchants in the cities above Hankau, till I-chang, are in so close relations with those of Hankau, as to be fully conversant with the practical advantages of steam-navigation, and would avail themselves of these at once on its introduction. When I reached I-chang-fu, on the 2nd of May, I found it confidently expected by the population, that in the fifth Chinese month steamers would commence to run between Hankau and I-chang, and foreign merchants take their residence at the latter place. The boatmen pronounced openly their usual and perfectly natural dissatisfaction, but the merchants did not conceal their perfect approbation, and appeared to delight in the prospect of having rapid and safe intercourse with Hankau, of seeing a visit to that city reduced from an adventurous journey of two months to a pleasure trip of a few days, and were convinced that the commerce of I-chang would rise to a more flourishing condition. At Chung-king-fu, the merchants are familiar with the fact, that the proposition of extending steam-communication so high up the river has been made. There they know less, what they may have to expect from such an innovation. But as soon as steamers go to I-chang, it will be their turn to awake gradually to the conviction, that the improvement of intercommunication means increased facilities and safety, and would confer incalculable blessings upon the country in which they live.

I have the honour to be,

Gentlemen,

Your most obedient Servant,

F. v. RICHTHOFEN.

APPENDIX.

I BEG to add to this letter a few notes which are not immediately connected with its contents. They are called forth by the way in which, in a book just under the press, several statements contained in one of my previous letters (Letter on Honan and Shansi), are criticised.* As the purpose of the criticism appears to be, not so much to correct my statements, as to impair their character of veracity, they might, if unanswered, reflect disadvantageously upon the contents of my other letters, and, among them, of the present one. It is for this reason, that I ask your indulgence for replying as briefly as possible to the single points of the controversy.

1.—On p. 141 to 143, the question is discussed, whether the people of Honan are goodnatured or not, and whether the country is populous. I beg to remark, that I gave both statements as the humble results of the impression I received on the road which I took, and do not believe that they are invalidated, as regards the character of the people, by those of travellers who visited other portions of the same province; while the fact of the depopulation and devastation of the country, as reported to the Throne by the Lieut.-governor of the province (according to Mr. Henderson's statement), were also mentioned by myself, though in regard to those districts only which were actually concerned, and not in that style of generalization, which it may have been in the interest of that officer to adopt.

2.—On p. 143, it is asserted that one crop of wild silk-worms is raised in Honan, and not two as I have reported. I have my statement from the growers themselves, whom I visited in their oak-plantations, on geological rambles through the hills between Nan-chau and Lu-shan-hien, in Honan, both of which places were, as far as I am aware, not visited by Mr. Henderson.

3.—On p. 143 to 145, my statement, that Tau-kou-chin—(Mr. Henderson adopts the spelling Tan-kow-ching, which is an often-repeated clerical error in my letter)—*is said to be* reached from Tientsin "by easy navigation," although corroborated by the testimony of Mr. Oxenham, is put at ridicule, because Rev. Mr. Williamson found in some portions of the Grand Canal no more than four feet of water. As the addition of this observation is all the new light thrown upon the subject by Mr. Henderson, it is difficult to discover how my remark should be invalidated. The author's experience on Chinese rivers is probably limited to steamers, because he would otherwise be aware, that most of the great rivers of China, which are considered by the natives as easy of navigation (as the Han, the Siang of Hunan, the Kan of Kiangsi, the Canton North river) have a less minimum depth of water than 4 feet. There can be no doubt whatever, that the importance of Tau-kou-chin as a market place is due to its connection by water, at all seasons, with Tientsin (a distance of 1,200 *li*), and that Siu-wu-hien, 170 *li* higher up the Wei River, can be reached by boat at high water. The navigation is only done by Chinese, and they call it easy.

4.—The next invective, on p. 145 to 147, is, like the foregoing ones, directed against statements which it was hardly within Mr. Henderson's province to refute, because he did not visit the localities concerned. I have mentioned, that the actual produce of the coal mines at the foot of the Tai-hang-shan (in Hwai-king-fu, Honan) is probably not far from 200,000 to 300,000 tons a year. Mr. Henderson takes the trouble to calculate, that 5,479 mules and donkeys would be required daily for carrying that amount of coal, and, by feeding his imaginary mules with 15 catties of grain and bran a day, and his donkeys with 8 catties of grain (6 and 3 would be considered full rations), arrives at what he considers astounding figures of the quantity of food which these animals would consume. The basis of these calculations is completely withdrawn if it is considered, that the transportation in that nearly level country is done, almost altogether, by wheelbarrows and large carts. The figure which I have given for the extraction of coal is based on observations such as the following: the number of buckets of coal raised in a certain length of time at one or other of the mines; the number of mines at work (making allowance of their difference of yield); the number of barrows, carts and donkeys met by me on the chief roads in a certain length of time, or passing a certain inn, etc.

5.—The same mode of calculation, based on imaginary mules and donkeys fed with undigestible rations, is applied in an attempt made on p. 147 and 148 to crush my estimate that "no less than 150, and probably as much as 300, tons of freight are carried daily over the road from Tse-chau-fu (Shan-si) to Hwai-king-fu (Honan,) from north to south" (p. 15 of my letter.) Mr. Henderson gives poor evidence of his appreciative spirit of the labours of others if, without having been to the place concerned, and without any other commentary but those mules etc., my figures are disparagingly spoken of as "these rather loose calculations;" and it appears to me that the last sentence given by him on p. 147 expresses the best maxim for those who try only to find fault with others, without being in the position to improve. The transportation on that road is done by men and animals, in nearly equal proportion as regards the weight of the freight; but men predominate much as regards numbers, consequent on the over-population of the department of Hwai-king-fu, a fact so seriously doubted by Mr. Henderson. Boys of 12 to 14 years are already engaged in the carrying. My figures, representing the estimated amount of the total freight, were derived from carefully counting, within certain intervals, the number of men and animals which I met within a certain space of time. I will mention only one of these figures. At noon, when the traffic was liveliest, I met, in the space of 20 minutes, 102 mules and 108 coolies carrying full loads. If the load of a mule is taken as 200 catties, and that of a coolie as 75, I passed 19 tons of freight in that short space of time.

* The book is written by Mr. Henderson, and is inscribed "Notes of a walk from Hankow to Peking in 1871." One-half of the second part of the book, commencing with p. 141, is devoted to the lengthy controversy. I was allowed, by the courtesy of the publisher, to see the proof-sheets as far as finished (p. 141 to 154) and the manuscript which contains the remaining portion of the criticism.

6.—I will not tire you with a discussion of the objections raised on p. 148 to 150 against the figures which I have given for certain altitudes in Shansi. I was only in the position to present you, provisionally, rough approximations, based on the readings of two aneroids of which I know the corrections, and was not provided with the remarkable instrument, the uncompared and uncorrected readings of which enabled Mr. Henderson to give at once so extraordinarily accurate figures.

7.—Nor will I enter upon the positive declaration (p. 150, 151), that the coal of the surroundings of the valley of Tai-yuen-fu is anthracite, and not bituminous coal (which I had called it in my previous, and have done again in this present, letter.) As among the attributes of the coal from various places are mentioned: "anthracite with smoke and smell," "burns quickly," "smokes a good deal," "with plenty of smoke," &c., and as coke is said to be made of the coal, it is quite evident, that the author attaches a different and much more general meaning to the word "anthracite" than the commonly adopted one, to which I have adhered. This conclusion is fully corroborated by the sentence given on p. 153: "it will be seen there are *all qualities of coal* at Ping-ting-chow. And *all these coals* so far as seen by us *were anthracite.*"

8.—The quality and prices of the anthracite of Ping-ting-chau form the subject of discussion on p. 151 to 153; but no additional information to my own is given, excepting that, besides the great number of mines visited by me, which furnish superior coal but are far off the high road, there are several small mines on the roadside, where anthracite of an inferior quality is mined. They are opened in those places where the small seams, which are intercalated between the larger ones, crop out.

9.—On p. 153 to 155, a calculation which I made in passing (p. 21 of my letter) is criticised. Its object was, to show that, if Tientsin and Peking were connected by rail with the coal-mines of Fang-shan-hien and Ping-ting-chau, those of the latter place would, notwithstanding their much greater distance, have a fair chance of supplying both markets, because, while the coal from them could be laid down at Tientsin at a trifle below, and at Peking at a trifle above, the price which that of Fang-shan would obtain, it is superior to the Fang-shan anthracite in several respects, among which is its solidity. Mr. Henderson, in reviewing these calculations, makes his criticism culminate in the supposition, that I have taken the lowest price of the best Ping-ting-chau anthracite—viz., 10 cash per picul, or 13 cents per ton, as the basis of my calculation. There was little cause for any reprimand on such grounds, as I have taken as a basis the price of 34 cents a ton, or 26 cash a picul. However, this is for the present quite immaterial, as the chances of the Ping-ting-chau anthracite are founded: in the thickness of the coal-bed; its horizontal position and easy access; the superior quality of the coal; the fact that Ping-ting-chau is situated on the great commercial road to Shansi, Shensi and the whole west; and that from it the large and populous plain of southern Chili could be supplied with fuel; and finally, in the circumstance that rich deposits of valuable iron-ore occur with the coal.

10.—The next subject taken up by Mr. Henderson is, the amount of iron produced in Shansi. From the light in which I put my estimate, that it is at least 160,000 tons yearly, it will be seen that, far from claiming to give this figure as a contribution to accurate statistics, I have freely confessed its necessarily vague character. The object of my estimate was this, to convey to others the impression which I as an eye-witness had received of the iron trade of Shansi, and to put it down in figures for further discussion, as approximately as the few data at my command would allow. I am gratified that Mr. Henderson has opened the same, but have the conviction, that a quiet and thoughtful discussion would do more towards correcting the figure given by me than one which appears animated by a spirit of contradiction. The iron-works of Ping-ting-chau, which are situated in Lo-ping-hien, Yü-hien, and on the roads from Ping-ting-chau to both places, have, as far as I am aware, not been visited by Mr. Henderson; and as he imagines that the iron produced not only in these districts, but also that of Lu-ngan-fu, has its sole outlet in Hwo-lu-hien, he arrives naturally at an under-estimation. Lo-ping-hien sends its iron chiefly to Shun-te-fu; Yü-hien supplies partly northern Shansi; and of Lu-iron only a small portion goes north-east. Also did Mr. Henderson have no occasion to witness the transportation of iron on the road from Tse-chau-fu to Ching-wha, which I estimated at 60 per centum of a daily traffic amounting to between 150 and 300 tons, or at between 90 and 180 tons daily. It is probable, that this figure can be taken as an average on that road, because the manufacture of iron continues throughout the year. I put the produce of Tse-chau-fu (inclusive of Lu-ngan-fu) at 200 tons a day. But I am now convinced that this estimate is too low, because a large portion of the Lu-iron goes eastward, to Chang-te-fu and Tsz'-chau, and another portion to Tai-yuen-fu and northern Shansi. Mr. Henderson shows that the produce of ten smelting establishments which he saw at Yang-ching-hien, amounts to three and one-fifth tons daily. We are, through this statement, not nearer the truth than before, in regard to that district, because there may be a great many other establishments scattered in out-of-the-way places. Mr. Henderson is perfectly correct in stating, that at Tai-yuen-hien, in regard to which I did not gather reliable information on my first journey, iron is not made at present, the manufacture having been discontinued. But, considering that I have omitted in my calculation some places, such as I-ching-hien, which supplies Shensi, and not made due allowance for Yü-hien, and that Tse-chau-fu is probably put down much too low, I am inclined to believe, that the figure of 160,000 tons a year is by no means too high an estimate. Mr. Henderson's favourite mode of calculating the number of animals required for transportation I have shown in notes 4 and 5 to be based on imaginary assumptions resulting from want of sufficient information in regard to the regions concerned. I may, however, remark, that figures of a few thousand as applied to mules or donkeys, in a small district where they are especially needed, are nothing extraordinary, in China. I have often met hundreds in the course of an hour.

11.—As regards the value of Hwo-lu-hien as the place from which a good partion at Shansi is commercially supplied, I have adduced sufficient additional evidence in favour of this my first impression, in the course of this letter, since I had repeatedly to mention that city as the starting place of nearly all goods coming from the east, and the place of destination of those going east. Through the whole length of the province, from the frontier of Mongolia to the Tung-kwan gate, Hwolu is in the mouth of everybody, as *the* great mart of Shansi. Mr. Henderson gives it as his opinion,—"That Whylu—(this is the local pronunciation)—is merely an emporium or principally so; a few of the small merchants for Shansi may barter their iron etc. for goods at Whylu, but I do not think a large amount of business is done in this way at Whylu." I do by no means pretend to know, that a large amount of business is done "in this way," but rather conclude from my scanty information, that more of a proper commercial and commission business is done; and my opinion, that this emporium is deserving a closer study, for the purpose of getting acquainted with the commerce of Shansi, is scarcely repudiated by the weight of Mr. Henderson's statement, that actually, some years since, one of the merchants of Tientsin has been at Hwolu.

12.—The twelfth and last point taken up by Mr. Henderson is: "The Loess of Northern China." The long and interesting discussion, which is free from that spirit of animosity prevailing in his previous pages, is based on careful personal

observation and the consultation of books. The conclusions arrived at are: 1st, that the word "loam" should be substituted for "loess;" 2d, that the theory of a subaerial origin of the loess, as proposed by me, is wrong, and Mr. Henderson's own theory, which considers the loess to be a sediment formed in a estuaries and lakes, probably correct. I have already given so long an exposé of my experience regarding the loess, that I abstain from entering into further details at this occasion. Yet I beg leave for a few brief remarks. First, as regards the name, everybody is, of course, at liberty to deviate from the ordinary nomenclature; and the generalizing of the word "loam" will certainly be less objected to than that of "anthracite" (see note 7). I believe, however, to have pointed at the difference of the application of "loam" and "loess," and follow common usage in geological language (which may not be in every case identical with that applied in the Book of the Farmer) in adopting the word "loess."

As regards the second conclusion, Mr. Henderson lays great stress on his conviction, that the loess is stratified. I have already spoken on this subject; however, as I did not desire to give you a geological treatise, but wished merely to convey, in general outlines, the chief characteristics of the loess, I have omitted a great many details, among which is the fact, that the lower portions of the loess, where it rests on the underlying rocks, are almost almost always of a reddish, colour and full of rocky debris, and lack many of the peculiarities of true loess, as it occurs in the centre of the large basins. It is partly this circumstance, and partly the want of Mr. Henderson's acquaintance with the difference between ordinary loess and re-deposited loess, which are at the bottom of his objections and have made him believe that that formation is stratified. Mr. Henderson was not fortunate in quoting, in chief support of this same view, the testimony of that excellent observer, the Rev. Mr. Alex. Williamson who, in Vol. I, p. 153, 178, 331 of his "Journeys in North-China," describes the remarkable denudations in the surroundings of the Han-sin-ling pass in Shansi, where, below the cover of loess, the coal-bearing strata and certain variegated clayey beds which overlie them are exposed in deep cuts, presenting "all the hues of the rainbow." I know very well that interesting place, having visited it in 1870, and then again in Dec. 1871; the plain description by Mr. Williamson is perfectly correct, and can only by arbitrary and wrong construction be applied to the loess.

The light which the organic remains in the loess throw upon its most probable mode of origin is, I believe, not sufficiently appreciated by Mr. Henderson. I mentioned, that they consist in bones of terrestrial animals, land-shells, and impressions of roots of plants. The bones were not seen by Mr. Henderson, and I have observed them only twice *in situ*. The peasants use them as manure, but collect them when their attention is drawn to them by a money-reward. The roots of plants have only left impressions; as a matter of course, Mr. Henderson has looked in vain for the substance of them. And as regards shells, the fact that snails pass the winter below the ground, sometimes several feet deep, and leave their abodes in spring, is by no means the fortunate discovery of Mr. Henderson, but is known very generally and since very long time. It appears not, however, that it can explain the existence of shells at the depth of hundreds of feet below the surface of the ground.

I do not believe that Mr. Henderson's variation of the river-and-lake-theory, as given first in a very ingenious way by Mr. Pumpelly, brings us any nearer the solution of the question as to the mode of formation of the loess. I will not enter here upon the numerous objections to it, because they are obvious and coincide with those which I raised against all other theories which make the loess a fresh-water or marine deposit. Mr. Henderson would probably abandon his views if he had had more extensive experience in regard to the loess. That it is very limited, is evident from the fact, that he apparently takes exception to my statement that millions of human beings inhabit caves in the loess, on the ground that in all his travels he has seen no more than 300 habitations in it. Where this formation is developed, he might often have seen many thousands of them in one day.

The full description of the loess, into which Mr. Henderson has entered, will certainly be read with great interest, and the value of his contributions to its knowledge, where he adduces facts, duly appreciated.

F. v. Richthofen.